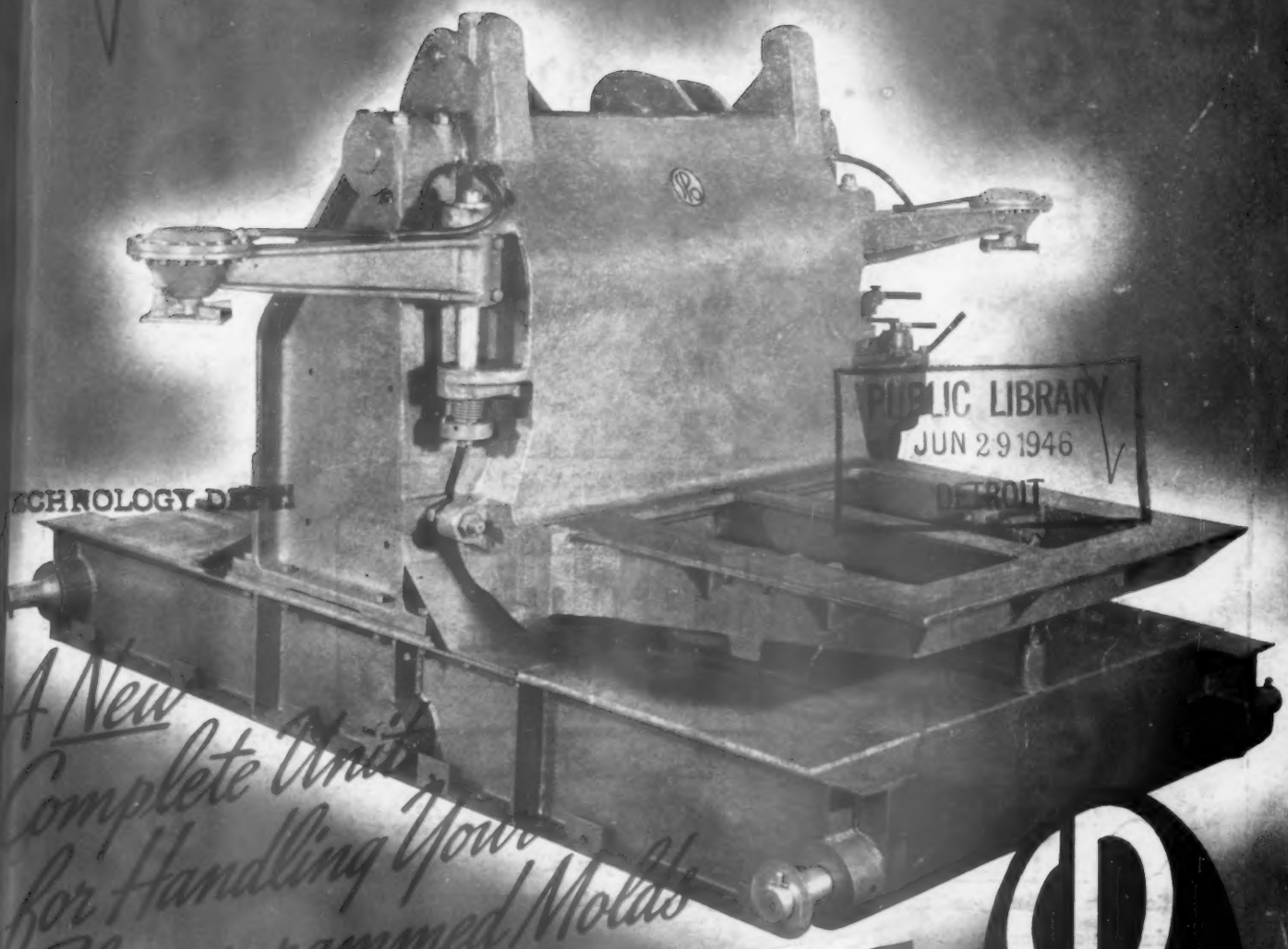
July, 1946

THE FOUNDRY

wherever metals are cast...



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JUN 29 1946
DETROIT

A New Complete Unit for Handling Your Slinger-rammed Molds

The illustration is of a special portable SPO Rockover Draw Machine designed and built for The Neenah Foundry Company at Neenah, Wisconsin. Towed behind a tractor type sand slinger, this machine supports the job during the ramming operation, clamps, rocks over and draws 40" x 66" and 44" x 44" x 15" drag molds. A SPO Portable Stripper Machine, also slinger-towed, is used for the mating cope molds.

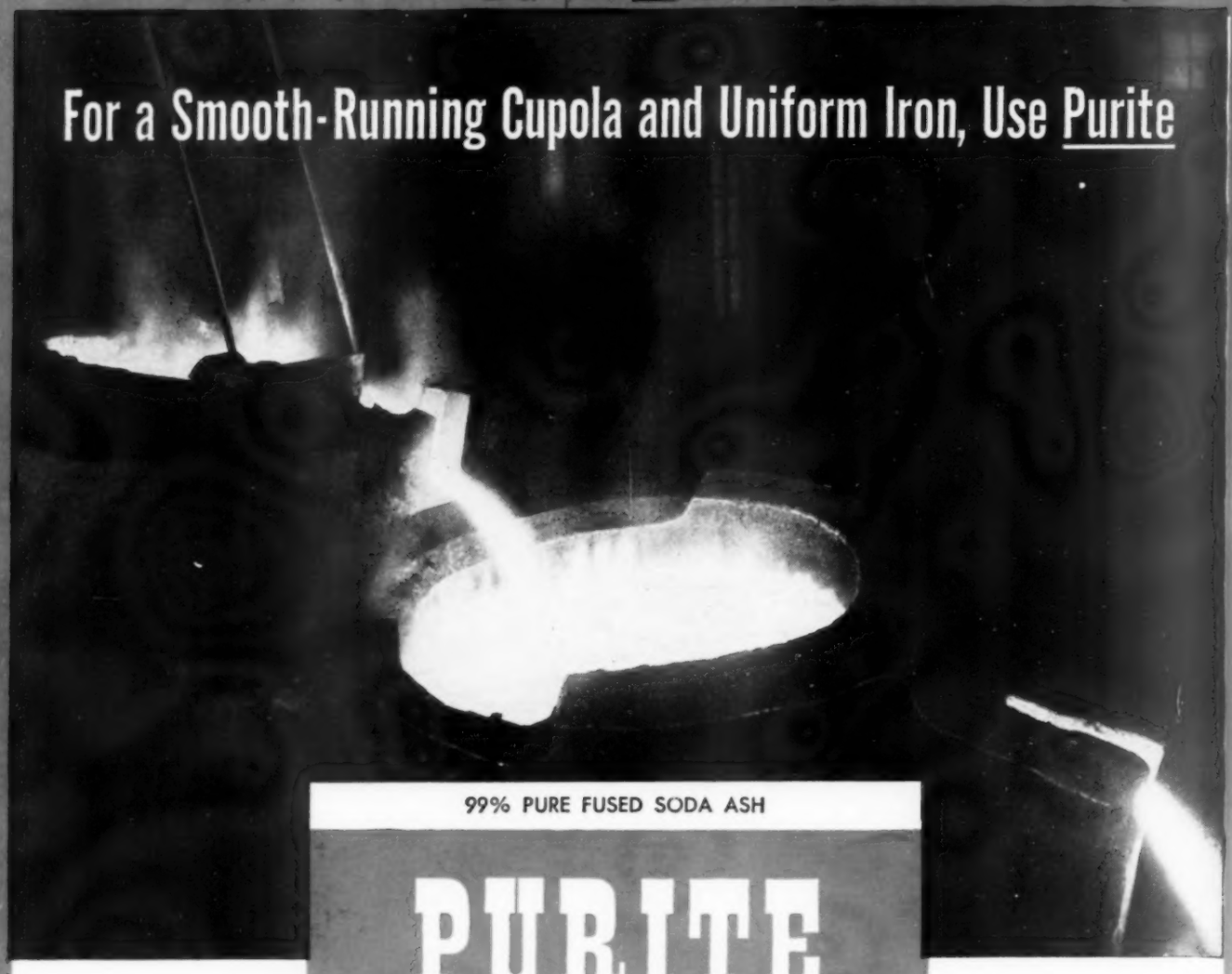
MEMBER

SPO, INCORPORATED

7500 GRAND DIVISION AVENUE, CLEVELAND 5, OHIO

✓R v.74a July - Dec. 1946

For a Smooth-Running Cupola and Uniform Iron, Use Purite



99% PURE FUSED SODA ASH

PURITE

The Scientific Flux for Better Melting and Cleaner Iron

A smooth-operating cupola, from the start to the finish of the heat, is the first essential in maintaining uniform iron in the mass production of specification castings.

Purite—in the cupola hearth or in the ladle—helps smooth out variations in the molten metal. By accelerating combustion reactions, Purite restricts the combustion zone to a smaller, hotter area over the tuyeres; it prevents bridging and reduces oxidation of the metal charge. Purite makes a refining slag which purges the molten iron of sulfur, oxides and silicates and thus helps to improve machinability and to reduce shrinkage and segregation defects.

Purite has been used for over 20 years in helping to make sounder and better castings. Can you afford to overlook this inexpensive means of improving your castings?

Our advice is always available—to help you improve your cupola practice and make better castings with Purite.

THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42nd STREET, NEW YORK 17, N. Y.
In Canada: Railway & Power Engineering Corporation, Limited

Mathieson
CHEMICALS

Purite (Fused Soda Ash) . . . Chlorine Dioxide . . . Caustic Soda . . . Soda Ash . . . Bicarbonate of Soda . . . Ammonia, Anhydrous & Aqua . . . Sodium Chlorite Products . . . Liquid Chlorine . . . HTH Products . . . Synthetic Salt Cake . . . Dry Ice . . . Carbonic Gas . . . Sodium Methylate

Tech

a long time since we roped this crane

Yes . . . Quite a long time. So long I'd just about forgotten the make of the rope.

So I said, "It's still in good shape, but I better find out where we bought it. We'll order another for a spare."

I looked it up. It was Purple Strand rope. It had been in service even longer than I figured. That's the brand we'll use on our jobs hereafter—all of 'em.

Bethlehem's Purple Strand is the ideal wire rope for heavy loads. It's built of premium steel, and it's tough . . . long-lasting . . . trustworthy. Buy it for cranes, hoists, and other machines engaged in severe lifting and handling service. It's built in many sizes, but all have the same high quality.

When you think WIRE ROPE

. . . think BETHLEHEM

SHAPES IN THE SAND

must be controlled

That's where the molder's skill comes in. Then the sand in the shapes must be controlled—that's where FEDERAL GREEN BOND comes in. FEDERAL GREEN BOND controls the strength of the sand to any desired limit. It may be mixed to produce an exceptionally firm sand, or a sand that collapses readily and runs freely.

FEDERAL GREEN BOND is so uniform that a handful could be taken from each of 10,000 bags and show no variation. It is this uniformity that makes GREEN BOND so dependable. That's why foundries all over the country specify GREEN BOND as a matter of course.

GREEN BOND

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

Seacoal Plant
CROWN HILL, W. VA. • CHICAGO • CHATTANOOGA, TENN. • DETROIT • MILWAUKEE • NEW YORK • ST. LOUIS • RICHMOND, VA. • Mines UPTON, WYO.

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THE FOUNDRY

for JULY 1946

VOLUME 74 NUMBER 7

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THE FOUNDRY is published monthly by THE PENTON PUBLISHING CO., Penton Building, 1213 West Third Street, Cleveland, O. EARL L. SHANER, President and Treasurer; GEORGE O. HAYS, Vice President and General Manager; RUSSELL C. JAENKE, Vice President; FRANK G. STEINEBACH, Vice President and Secretary, and EDITH L. WERNER, Assistant Treasurer.

Subscription: In the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $3; two years, $5. Other foreign countries, $5. Single copies 35 cents. Copies published three months or more previous to date of current issue, 50 cents.

Member: Audit Bureau of Circulations, Associated Business Papers, National Publishers Association. Copyright 1946 by THE PENTON PUBLISHING CO.

Entered as second class matter at postoffice at Cleveland under the act of March 3, 1879.

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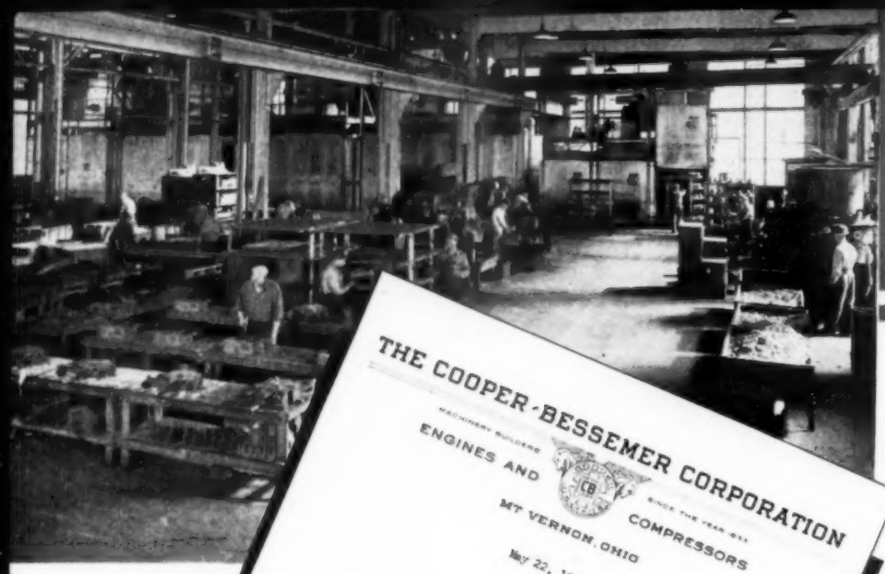
OUNCES



THE COOPER-BESSEMER CORPORATION

MOUNT VERNON, OHIO

ENGINES AND COMPRESSORS

May 22, 1946

THE WERNER G. SMITH COMPANY
(Division of Archer-Daniels-Midland Company)
Cleveland, Ohio

Gentlemen:

For many years we have been using your Core Oil in making a great variety of sizes of cores, running from a few ounces to several tons in weight. We found your oil to be uniform in quality.

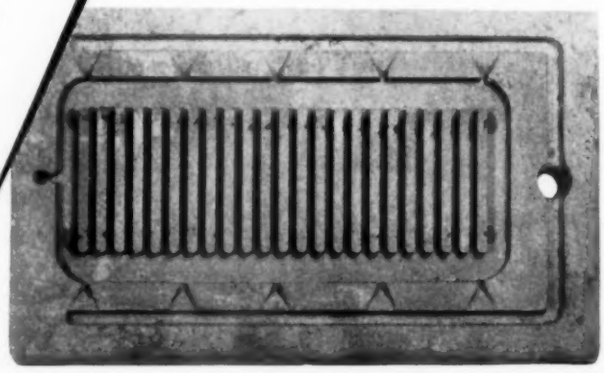
We appreciate your help during the War Years when you met Schedules upon which we agreed.

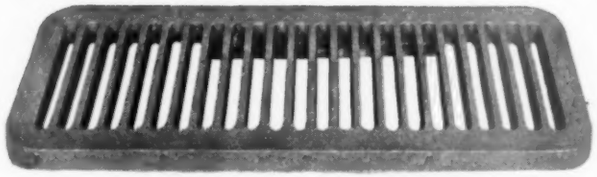
We, also, appreciate the help you gave us regarding some of the problems that came up in connection with core making.

Yours very truly,
THE COOPER-BESSEMER CORPORATION
P. R. LETZ
Works Manager

PRL:HS

The Cooper-Bessemer Corporation, Mt. Vernon, Ohio, make most of their castings in dry sand, thus assuring accuracy, speed, and very small loss of castings.





There was a time when core oil was considered too expensive for large cores. That conception has largely given way to the theory that the best is cheapest in the end, and today a very large proportion of the oil we sell is going into large work. Greater speed, greater accuracy, lower cleaning costs, all are elements in this changed attitude, but perhaps the most important reason is that the Linoil cores are less likely to wash and cause sand inclusions in the casting or to cause gas pockets in the mold. It is also becoming more common practice to use dry sand (Linoil) for the exteriors of large castings. The same virtues that make Linoil the universal choice for small and medium interior cores naturally make Linoil the choice for large cores both for interior and exterior use. It is well to know that you are using uniform oil when making 14-ton castings.

THE WERNER G. SMITH CO.

(DIVISION OF ARCHER-

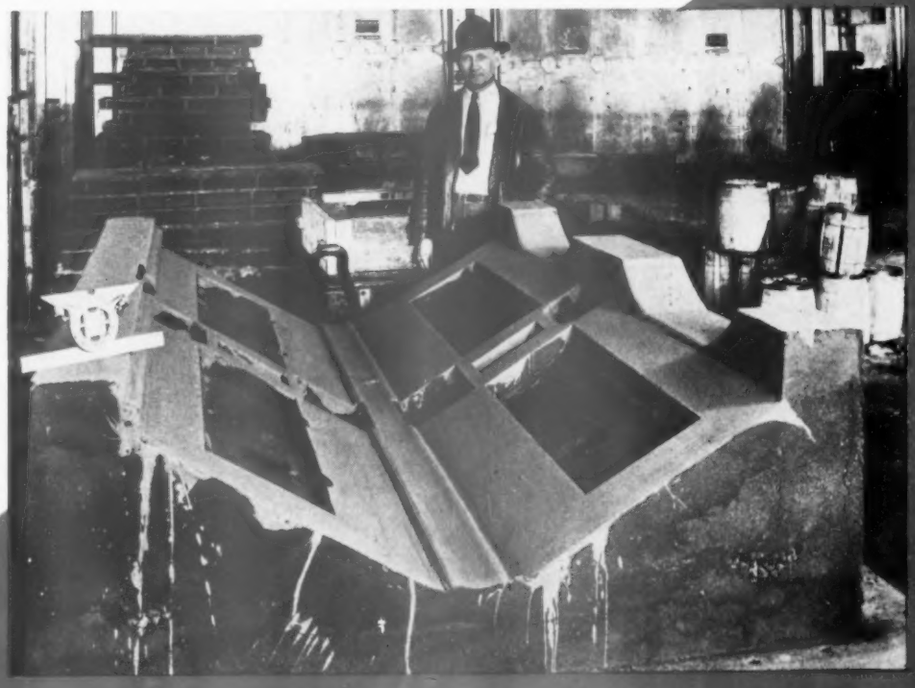
2191 WEST 110 STREET WOODBINE

TONS-DRY SAND

The large core at the bottom of the page is rammed up of hydroblast reclaimed core sand, oven dried. It is a core for an engine base. Three of these cores are assembled in the

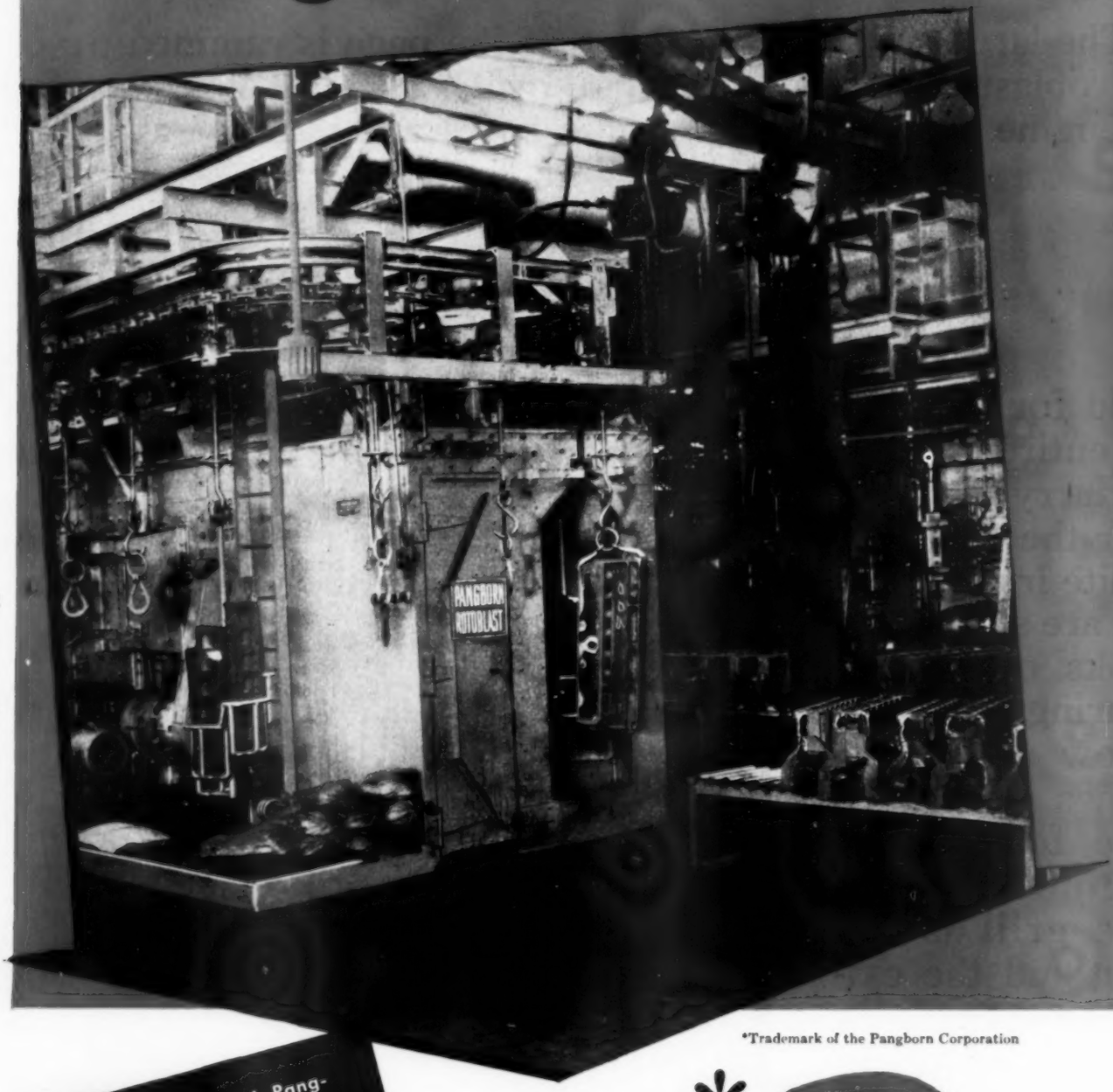
LINOIL

mold for a tank cylinder base. This casting weighs 14 tons. An entire assembly uses 35 to 40 tons of oil sand, according to Harry Stutzman, foreman of core department, who stands near the core. The Cooper-Bessemer Corporation uses meehanite iron for all castings. The valve guard grill cores at the left are stacked in books of ten for pouring. Picture below the grills shows the main core for a large engine cylinder. The grill is 36" long and the cylinder block is about 30" each way.



SMITH COMPANY
DANIELS-MIDLAND COMPANY
4690 CLEVELAND 2, OHIO

Largest Order for Airless B



Entrance end of Pangborn ROTOBLAST Cylinder Block Cleaning Machine. Indexed conveyor hooks carry work through blasting chamber.

*Trademark of the Pangborn Corporation

ROTOBLAST

*Roto

HANDLES 600 MOTOR BL

ss Blast-Cleaning Equipment Comes to PANGBORN!!

Here's the best proof yet that Pangborn has the *extra value* that production-minded manufacturers always look for.

One of the world's largest automobile manufacturers has used Pangborn ROTOBLAST* equipment for eight years. Now this company—famous for its astute purchasing—has placed with Pangborn the *largest order ever placed for airless blast-cleaning equipment!*

What are the reasons for this preference? *Outstanding engineering.* ROTOBLAST airless blast cleaning utilizes centrifugal force (developed by a rapidly revolving wheel) to do the work—increasing production, improving quality, reducing maintenance, eliminating spoilage, saving on cost of abrasives, facilitating inspection and machining. *High standards of workmanship.* Satisfied customers in 20 automotive plants and more than 1500 other types of manufacturing plants testify to the high quality of ROTOBLAST equipment.

Look to Pangborn for the important new developments in blast cleaning. Come to Pangborn for the equipment selected to fill the largest order ever placed for airless blast cleaning!

For complete information on ROTOBLAST equipment, address Pangborn Corporation, Hagerstown, Maryland, *world's largest manufacturer of blast cleaning and dust control equipment.* Send coupon below.

The Choice on the Largest Order Ever Placed

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

oblast

OR BLOCKS PER HOUR

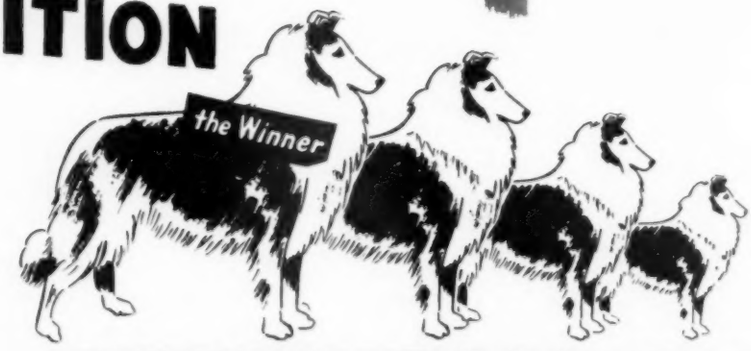
Latest Information on Economical Blast Cleaning

Pangborn Corporation, Hagerstown, Maryland
284-A Pangborn Boulevard

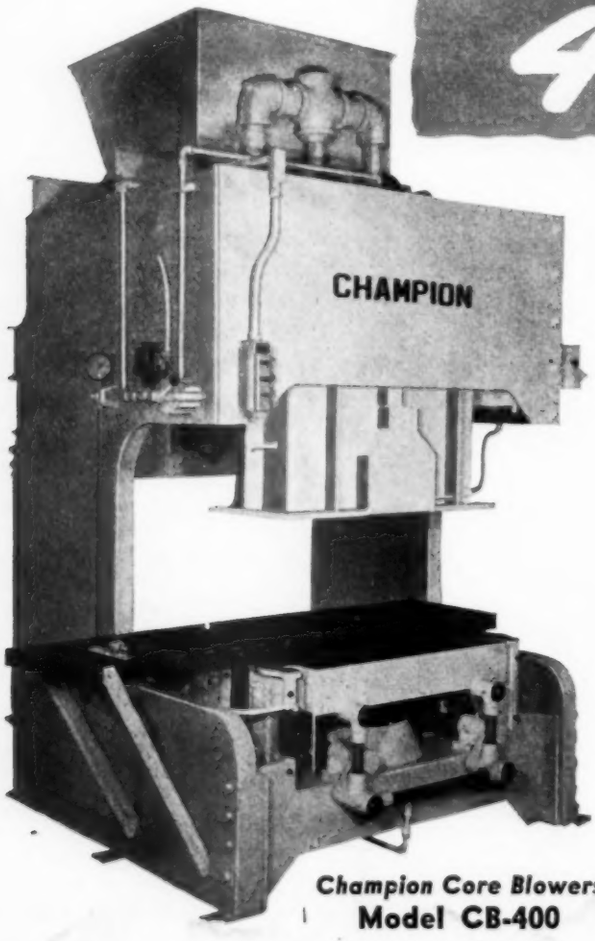
Gentlemen: Please send me free bulletin checked:
ROTOBLAST Barrels, No. 213 ☐ ROTOBLAST Special Machines, No. 2120 ☐ ROTOBLAST Tables, No. 211 ☐
Air Blast Rooms, No. 400 ☐

Name..... Title.....
Company.....
Address.....

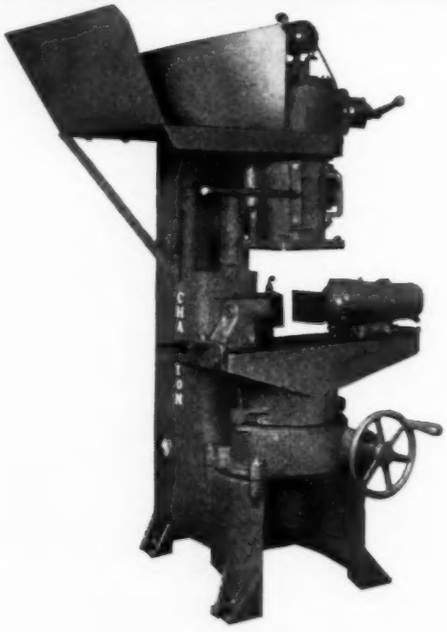
RECONVERSION
WILL MEAN
KEENER COMPETITION



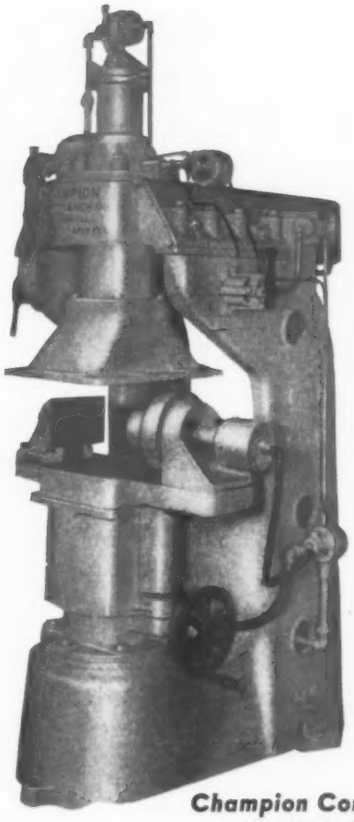
4 GREAT
ARE READY TO



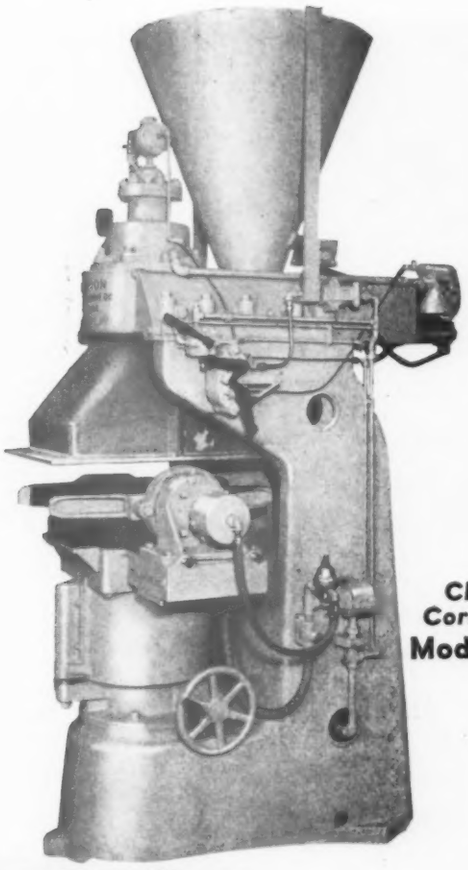
Champion Core Blowers
Model CB-400



Champion Core Blowers
Model CB-10



Champion Core Blowers
Model CB-12



Champion
Core Blowers
Model CB-15

CHAMPIONS
MEET THE CHALLENGE

These four great *Champions* are True-Blue Ribbon winners—*Champions* every inch and every pound of them, backed by almost a half century of foundry "know-how." That's why we at *Champion* can guarantee complete satisfaction from every installation. Each model has been tried and proved in many of the world's leading foundries, small and large.

By simply setting the box and pulling the lever, any person without previous experience can produce perfectly rammed cores on a *Champion*. A single valve operates the core box clamp, clamps same against the blow plate, blows the core, exhausts and releases the clamp in the proper cycle. Regardless of size or design —small or large, simple or complex cores —the ramming time is identical.

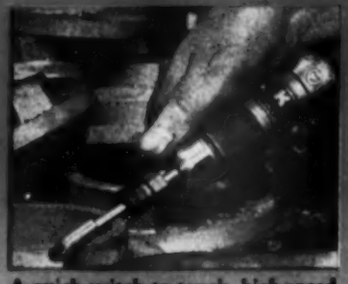
When keener competition comes, stay with the winner, who'll still be *Champion*.

CHAMPION
FOUNDRY & MACHINE CO.

1318 WEST 21st STREET CHICAGO 8, ILLINOIS

Close tolerance grinding and buffing of intricate and complicated dies assure accuracy and smooth surface.

All-day grinding at high speed won't overheat air-cooled, lightweight pneumatic die grinders.



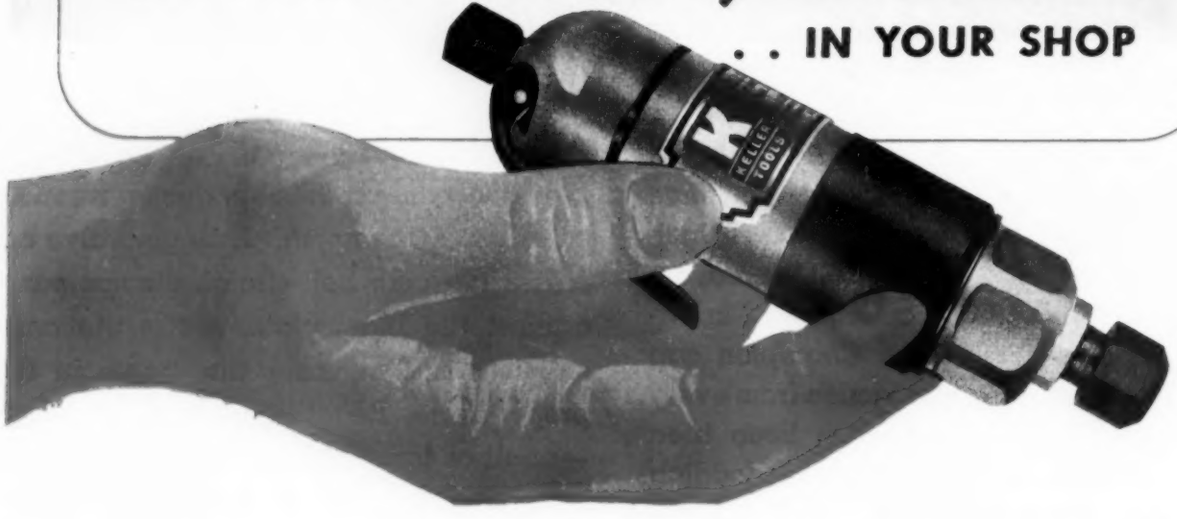
A quick switch to tough, high-speed cutters for smoother burring and for removing fins.

Pattern making in wood or metal will be made easier with rotary files in Keller Die Grinders.

This speedy, easy-to-handle tool can be used for drilling in wood and soft metals.

The most willing worker

. . IN YOUR SHOP

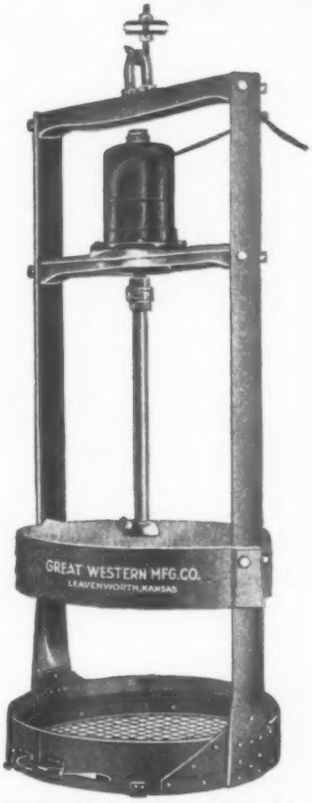


Take this mighty air tool in your hand—slip a grinding wheel in the collet, and feel that motor deliver power plus . . . 25,000 rpm. Precision bearings and built-in oil reservoir are but two of the extra features that keep Keller Grinders at work. Another Keller tool that gets the job done!

KELLER
Pneumatic Tools

KELLER TOOL COMPANY • 4607 LAKE ST. • GRAND HAVEN, MICH.

Combs GYRATORY FOUNDRY RIDDLES



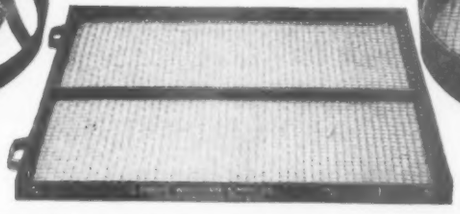
TYPE "CR" . . $260.00 Complete

TYPE "V" —20" dia.—$210.00 Complete
TYPE "V-5"—36" dia.—$375.00 Complete

TYPE "CS" . . $270.00 Complete

STEEL RIM & BOTTOM
For Type "V" . . . . 20" Dia.
For Type "V-5" . . . 36" Dia.

STEEL RIM & BOTTOM
For Type "CS" . . 24" Square



STEEL RIM & BOTTOM
For Type "CR" . . . 24" Dia.

SIEVE BOTTOMS

Made of VERY HEAVY galvanized wire
Order by Gauges Specified

TYPE "V" 20" Dia.			TYPE "V-5" 36" Dia.			TYPE "CR" 24" Dia.			TYPE "CS" 24" Square		
Mesh	Gauge Wire	List ea.	Mesh	Gauge Wire	List ea.	Mesh	Gauge Wire	List ea.	Mesh	Gauge Wire	List ea.
2	14	$1.30	2	14	$4.20	2	14	$1.80	2	14	$2.25
3	16	1.30	3	16	4.20	3	16	1.80	3	16	2.25
3½	18	1.30	3½	18	4.20	3½	18	1.80	3½	18	2.25
4	18	1.30	4	18	4.20	4	18	1.80	4	18	2.25
5	20	1.30	5	20	4.20	5	20	1.80	5	20	2.25
6	20	1.30	6	20	4.20	6	20	1.80	6	20	2.25
8	20	1.30	8	20	5.00	8	20	1.80	8	20	2.25
Discounts—			Discounts—			Discounts—			Discounts—		
1 to 5 Inc.		Net	1 to 5 Inc.		Net	1 to 5 Inc.		Net	1 to 5 Inc.		Net
6 to 23 "		5%	6 to 23 "		5%	6 to 23 "		5%	6 to 23 "		5%
24 or more		10%	24 or more		10%	24 or more		10%	24 or more		10%

QUANTITY DISCOUNTS WILL APPLY ON MIXED MESHES

STEEL RIMS	STEEL RIMS	STEEL RIMS	STEEL RIMS
Type "V" 20" Dia.—$3.60 set	Type "V-5" 36" Dia.—$14.50 set	Type "CR" 24" Dia.—$5.10 set	Type "CS" 24" sq.—$5.10 set

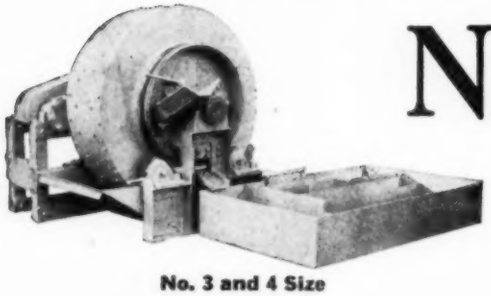
GREAT WESTERN MFG. CO. NOT INC.

LEAVENWORTH, KANSAS

SPECIAL

ANNOUNCEMENT

for the small non-ferrous foundry melting 600 pounds or more per day, with a 5% metal loss



No. 3 and 4 Size

NEW ALL STEEL METAL RECLAIMING MILL

CLEAN SCRAP VALUE

from SKIMMINGS • SPATTERS • SPILLS • CINDERS AND SWEEPINGS

WILL COVER ALL COSTS and RETURN A SUBSTANTIAL PROFIT TO YOU!

REMELTING YOUR SCRAP

Based on 12 Cents Per Pound Value, Will Return a

NET PROFIT OF

150%

Shipped—completely assembled, to place on a level floor, ready for operation. Made in FOUR SIZES. Used for many years by foundries, smelters and rolling mills—for production up to 24 tons per day.

ASK FOR 36 MONTHS PAYMENT PLAN

USING THIS MILL

Your Disposal Will Consist of Waste Removed From the Settling Tank After

ALL METAL IS SEPARATED AND RECLAIMED

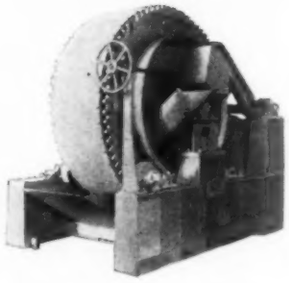
DREISBACH ENGINEERING CORP. Date .....
Warburton Ave., Yonkers 2, N. Y.

We shall be pleased to receive, with no obligation on our part, a proposal from you, including total cost to us for installations of a reclaiming mill suitable for our conditions.

Melting per Day ..... In Pounds
Cost of Metal ..... " "
Metal Loss, in Waste Material ..... Per Cent
Approximate Tonnage for Milling ..... Per Month
Clean Reclaimed Metal-Value ..... As Scrap ..... c per Lb.
Remelt ..... c per Lb.
Electric Current Conditions ..... AC. D.C. V.C. Ph.
Power Cost ..... Per K.W. H.P.
Water Costs ..... Per 100 Gal.

Name .....
Address .....

Tear Out and Mail



No. 5 and 6 Size

DREISBACH ENGINEERING CORP.
WARBURTON AVENUE
YONKERS 2, NEW YORK

STOP LOSING MONEY

...get faster-baking cores

STOP LOSING MONEY

STOP LOSING MONEY

STOP LOSING MONEY

STOP LOSING MONEY with slow-baking cores that tie up your ovens! Truline-bonded cores bake up to 25% faster, often eliminate one extra trip through tower ovens.

STOP LOSING MONEY with cores that are hard to shake out! Truline* cores burn out quickly, shake out easily, save as much as 50% of valuable cleaning time. Foundrymen report this saving, alone, more than pays for the Truline Binder used.

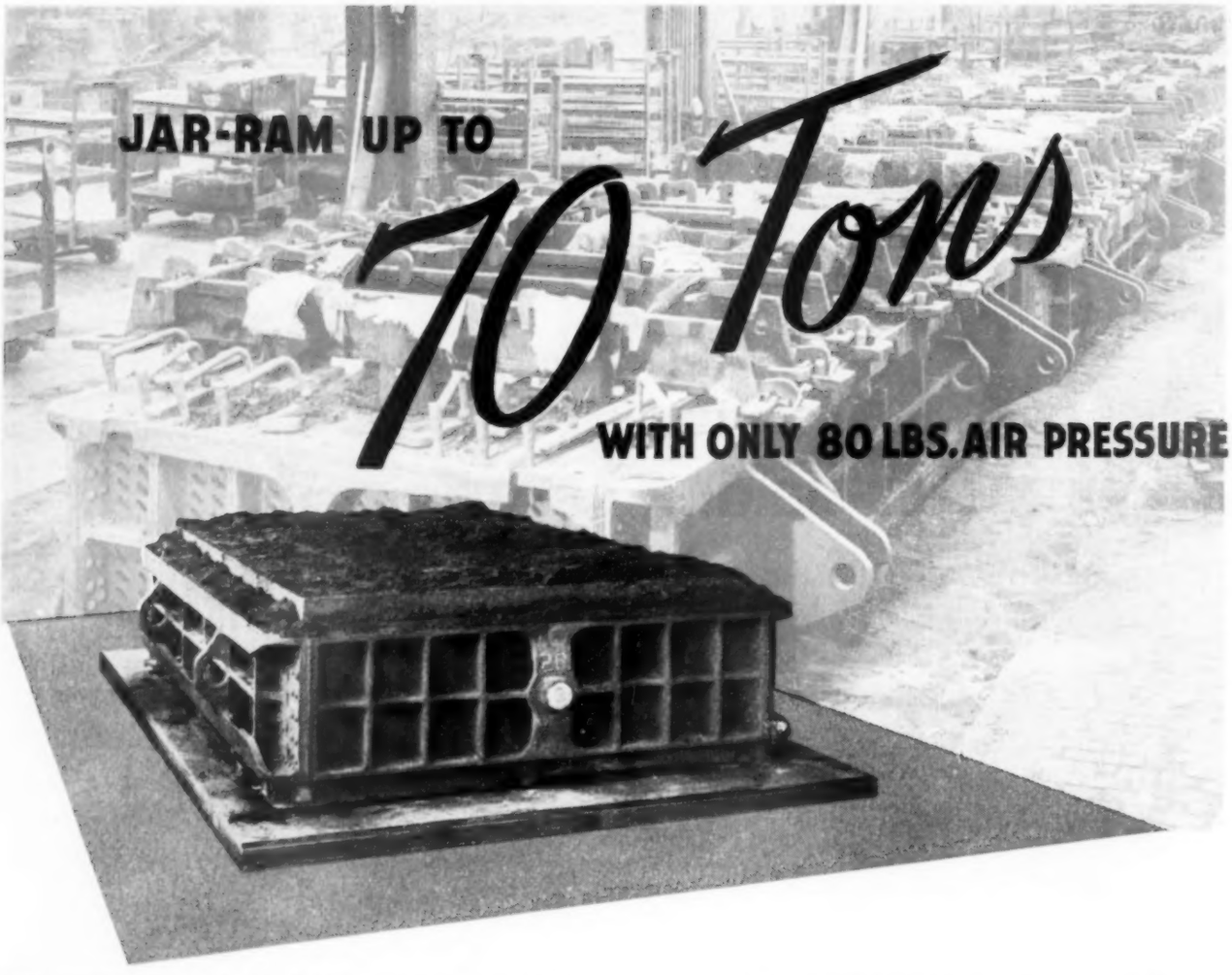
STOP LOSING MONEY with less economical binders!

HERCULES
TRULINE BINDER

Naval Stores Department
HERCULES POWDER COMPANY
INCORPORATED
999 Market Street, Wilmington 99, Del.

*REG. U.S. PAT. OFF. HERCULES POWDER CO. INC.

FB-63



When those big jobs come up be all set to get them out in a hurry—and make money, too. You can do it with Herman Molding Equipment.

Regardless of what your molding problem may be, large or small, the skill and experience of Herman's more than forty years of exclusive molding machine design and production will answer it better and more effectively. Any size mold is better rammed on a Herman. Foundries throughout the nation and abroad are taking advantage of the superior design and engineering features built into Herman Molding Machines.

Make your own comparisons—then call in a Herman Engineer.

MOLDING HERMAN MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

VOLCLAY BENTONITE

NEWS LETTER No. 13

REPORTING NEWS AND DEVELOPMENTS IN THE FOUNDRY USE OF BENTONITE

THE BIG THREE

Sand – Volclay – Water combinations will make any mold for casting of metals.

Other ingredients when readily available add desirable properties under certain conditions, but when they are not obtainable, equally good results can be maintained with the "BIG THREE".

Auxiliary binders, such as cereal, resins, pitches, etc. are handy tools and are very effective in certain cases, but they are not indispensable.

Cereal gives high mold skin hardness, high dry strength, encourages collapsibility with low fired strength but decreases flowability making a stiffer working sand. It does however, lengthen the working moisture range.

Volclay, Western Bentonite, gives high green, dry and fired strengths. It decreases flowability only slightly when the additions are increased.

If mold skin hardness is desired, the spraying of the surface of the mold with a diluted mixture of either glutrin or molasses water is recommended. This renders the mold edges less friable.

Large copes may be held more rigid by adding a glutrin water to the "BIG THREE" or by adjusting the grain distribution of the base sand. Finer sands usually give greater density.

If lower dry or fired strengths are desired, the addition of 1% – 2% of Panther Creek, Southern Bentonite, is recommended. This bentonite does not create gas as other collapsible binders do, but furnishes easy shakeout.

Wood Flour additions with Volclay reduce fired strengths, but wood flour does not add green strength to the sand mixture. It acts as a buffer against sand expansion.

Fuel oil added to heap sand prevents drying out.

Less than 1% increase of Volclay, to replace the accustomed 1½% cereal binder, is satisfactory to maintain the same green strength, and ramming is much improved, as cereal impedes flowability. There is less danger of soft spots in the mold when only the "BIG THREE" are used.

Combinations of bentonite and cereal have long been successfully used in foundry practices, but the "BIG THREE" do the job equally well.

AMERICAN COLLOID COMPANY

363 WEST SUPERIOR STREET • CHICAGO 10, ILLINOIS

Producers of Volclay and Panther Creek Bentonite

48 Standard Models
GAS · OIL · ELECTRIC
Now Available!

UNIFORM
Powerful cross-flow heating system assures IDENTICAL BAKING IN ALL DRAWERS.

FLEXIBLE
Large and small cores BAKE AT SAME TIME in separate or same drawers! Allows continuous production baking.

ECONOMICAL
A big money-saver! Recirculates up to 80%; has high efficiency heater, thick insulation, drawer seals.

L-4860-3
Despatch *Coremaster* Oven

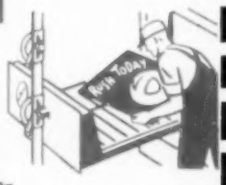
DESPATCH *Coremaster* DRAWER TYPE OVENS

BAKES THICK & THIN CORES at same time.

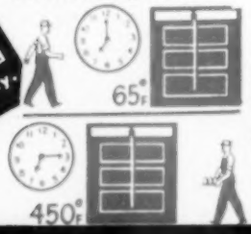
Each drawer is equivalent to an oven section; lets you bake big and little cores simultaneously. A topnotch feature that pays for itself!

HANDLES RUSH JOBS FASTER and better.

Rush jobs needn't wait if you have a *Coremaster;* any drawer space can be used immediately without waiting for production baking to get out of the way. Speeds service to customers and cuts core baking costs!



PREHEATS FAST, BAKES FAST and is always ready.



Cold oven preheats in about 15 minutes while you are loading drawers! Gives you an ever-ready oven and eliminates need for coming early to "light up."

PRINTED IN U. S. A.

Here is your opportunity to get one of the popular all-purpose core ovens that made such a hit at the Foundry Show–the DESPATCH *Coremaster* Drawer Oven!

This is the oven foundrymen stopped to admire for its rugged compactness, its smooth running drawers, its ingenious method of driving uniformly heated air through all drawers to assure fast even baking of capacity loads.

FOR PRODUCTION BAKING AND RUSH JOBS

Carefully engineered and built for heavy-duty performance, a DESPATCH *Coremaster* gives you ample capacity for both production baking and rush jobs. Drawers range from 30″ x 36″ in size up to 48″ x 72″; and from 8″ to 18″ deep . . . large enough to handle all usual work. Your choice of 3, 4 or 5 drawer types in 48 standard models; gas, oil or electric . . . *For early delivery, order today!*

A Despatch Coremaster Oven WILL PAY FOR ITSELF IN ANY FOUNDRY!

DESPATCH OVEN COMPANY MINNEAPOLIS 14 CHICAGO 1

Ten EASY-TO-UNDERSTAND *Reasons* WHY

DELTA GRAKOAT

CORE AND MOLD WASH

INCREASES PRODUCTION OF FINER-FINISHED CASTINGS AND *Cuts Cleaning Room Costs*

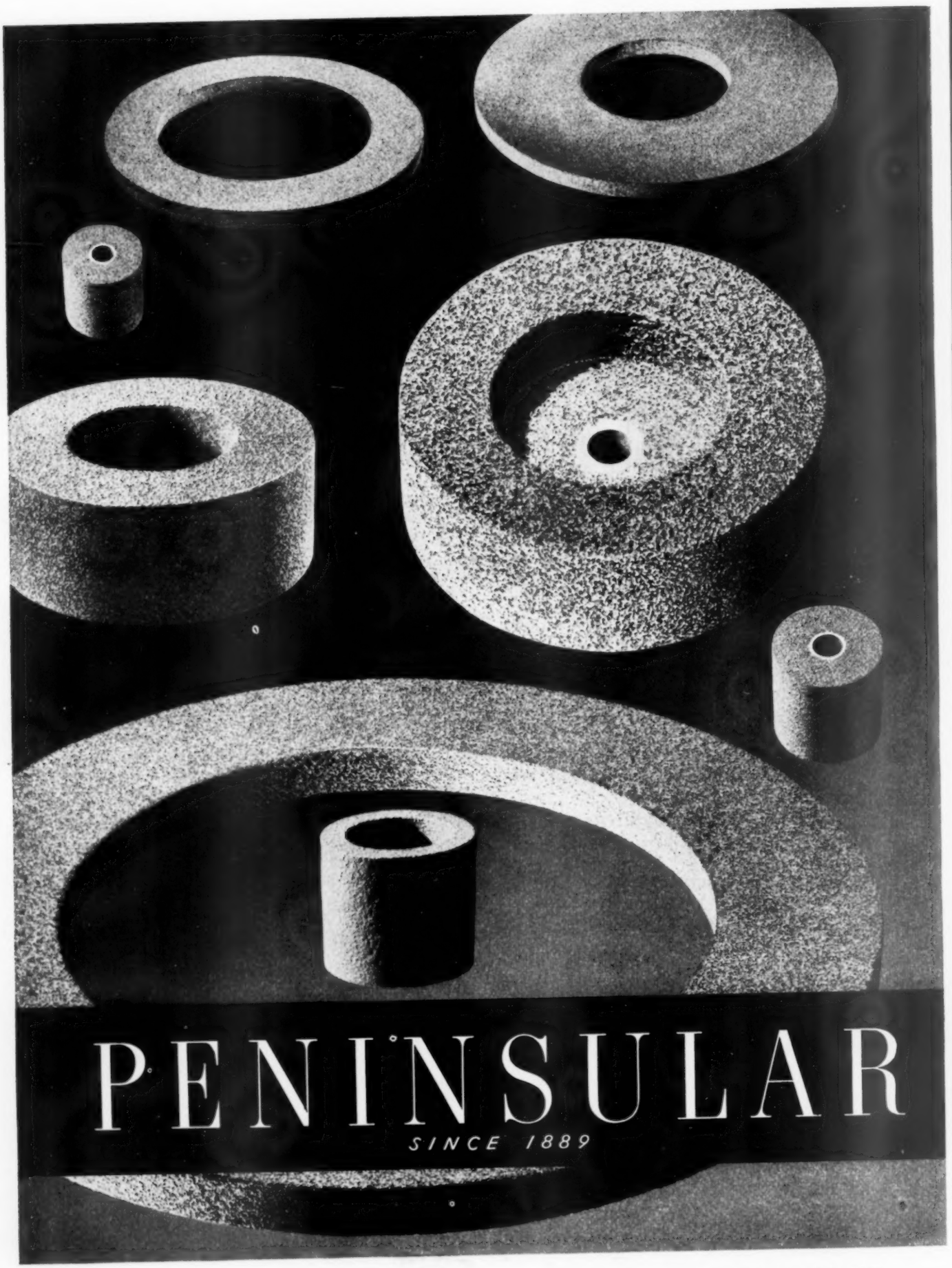
1. **MOISTURE PROOF** — When thoroughly dried, will not absorb moisture.
2. **NO PRECIPITATION** — When properly mixed, will stay in suspension indefinitely. Will not deteriorate.
3. **HIGHLY REFRACTORY** — Molten Metal lays on surface without the least disturbance.
4. **HIGH FUSION AND UNUSUALLY HIGH HOT STRENGTH** — No fusion or sinter below 3400°F. Hot strength over 600 p.s.i.
5. **NO GAS** — It is non-reactive with molten metal and liberates no gaseous vapors.
6. **ANCHORS ITSELF TO SAND SURFACES** — Penetrates into sand surfaces, which prevents flaking, peeling, scabbing, when in contact with molten metal.
7. **EASY TO APPLY** — Can be sprayed, swabbed, dipped or brushed on either green or dry sand surfaces.
8. **PRODUCES SMOOTH SURFACES** — Casting surfaces are free from burn-in or metal penetration.
9. **CUTS CLEANING COSTS** — Surfaces are smooth and require minimum amount of cleaning.
10. **ECONOMICAL TO USE** — Covers greater surface area than other washes.

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF FOUNDRY PRODUCTS, INDUSTRIAL AND AUTOMOTIVE OILS, GREASES AND COMPOUNDS

MILWAUKEE 9, WISCONSIN

DETROIT PUBLIC LIBRARY


PENINSULAR
SINCE 1889

Each wheel made for an Individual Job

THERE are 12 entirely different Peninsular grinding wheels on these pages—yet, they all have a common attribute that makes them the most efficient and economical wheels for their individual jobs.

Like every wheel that Peninsular makes, each one was manufactured to a special wheel formula, developed by our engineers after a careful study of the requirements of each customer.

And before they were produced in quantity, each wheel was tested and proved on the actual work itself.

Regardless of what your grinding problems may be, we are willing to stake our reputation that our expert staff of factory and field engineers can help you solve them.

A production, engineering and cost analysis service beyond any offered up to now in the industry stands back of this challenge.

The Peninsular Grinding Wheel Company, 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Newark, Pittsburgh, Houston, St. Louis, Cincinnati.

INDIVIDUALLY PENINSULAR *ENGINEERED*

GRINDING WHEELS

SPECIALISTS IN RESINOID BONDED WHEELS

TRADITIONAL QUALITY

A STAR IN OUR CROWN...MONEY IN YOUR POCKET

More precious to this company than all its physical assets is UNITED STATES TRADITIONAL QUALITY . . . *more precious to you* is the quality which *puts money in your pocket because the tools stand out as superb examples of the toolmaker's craft.*

Put this to the test . . . do as leaders in your industry have been doing for 48 years . . . respect the GOOD MECHANICS' CHOICE . . . depend on

UNITED STATES ELECTRICAL TOOLS FOR PRODUCTION AND MAINTENANCE

DUAL MOTOR VARI-SPEED SNAGGING GRINDER
Model 62VS

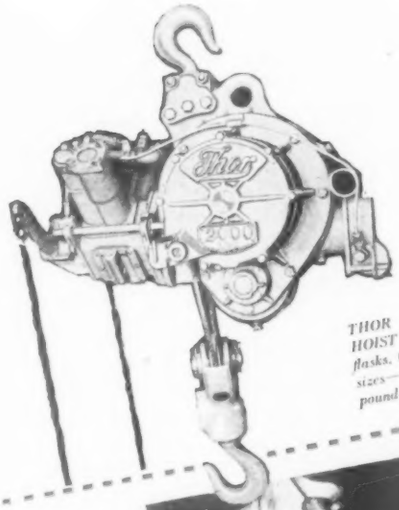
For Vitrified or High Speed Wheels

Constant peripheral speed, for each wheel, results in increased production and longer wheel life. Maximum peripheral speed can be maintained for the life of the wheels. Adjustable wheel guard and speed changer are interlocked to prevent overspeeding of grinding wheels. Totally enclosed fan-cooled ball bearing motors. Magnetic starters. Push button stations on front of pedestal. Heavy chrome-manganese spindles operate in heavy duty ball bearings. Wheel guards of boiler plate ADJUSTABLE TO WHEEL WEAR. Safety eye shield and numerous other features.

Write for catalog, delivery dates and other information

THE *United States* ELECTRICAL TOOL CO.
CINCINNATI 14, OHIO

WHEN THE JOBS ARE TOUGH



THOR AIR MOTOR HOIST — for handling flasks. Complete range of sizes—500 to 6,000 pounds capacity.

MODERN Thor TOOLS

SIMPLIFY FOUNDRY OPERATIONS . . . . . SAVE TIME AND LABOR

THOR PNEUMATIC GRINDERS—for cleaning room use. Complete range of portable grinders: (radial wheel type or surface type using cup grinding wheels.)

THOR CHIPPING HAMMERS — for cleaning room chipping. Complete line—all sizes, 3/4" to 4" stroke.

THOR CORE BUSTERS—for knocking out cores from castings.

THOR PNEUMATIC RAMMERS—a complete line for floor or bench work; core room and molding machine sand ramming, piening and butting off.

Shop men welcome the aid of powerful Thor Pneumatic Tools—because they get work done *easier* and faster. Net results are more production at lower cost. Thor Pneumatic tools provide the right combination of maximum power, light weight, perfect balance and smooth operation. Valuable *plus* features include: instant starting, positive control and extra rugged construction. Thor tools for foundry use are made in a wide range of styles and sizes. Ask a Thor engineer to give you all the facts—or, call your nearby Thor branch.

Thor PORTABLE POWER TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

INDEPENDENT PNEUMATIC TOOL COMPANY
600 W. Jackson Boulevard, Chicago 6, Illinois

Birmingham Boston Buffalo Cleveland Detroit Los Angeles
Milwaukee New York Philadelphia Pittsburgh St. Louis
Salt Lake City San Francisco Toronto, Canada London, England

GLASS SHELLAC POT

- Tough and Durable—Will stand very rough usage
- ¼" Replaceable Wood Dowel Wiping Bar
- Capacity—approx. 1½ quarts
- Height Overall (Pot and cap) 11 inches
- Keeps your shellac clean
- Packed one in carton

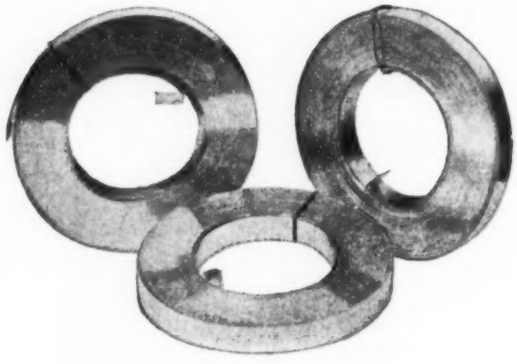
Price Each $3.25

FREEMAN DOWMETAL

5/16"-3/8"-1/2"-5/8"-3/4"-1" Thick

We allow 1" for flask and 2½" on each end for pins and ears

One day delivery . . . order by flask size; if square give overall size



Zinc Tape

Size of Tape	3/8"	7/16"	1/2"	9/16"	3/4"	7/8"	1 1/8"	1 1/4"	1 1/2"
Size of Letter	1/8"	3/16"	1/4"	9/32"	5/16"	3/8"	1/2"	5/8"	3/4"
Weight Roll in lbs.	1 3/4	1 7/8	3	4	4 1/2	5	7	7 1/2	9
Number of feet in roll	112	100	160	145	115	105	95	80	80
Price per lb.	$0.43	.41	.40	.39	.36	.36	.35	.35	.35

We carry only ZINC tape in stock as this is used in 99 per cent of all cases.

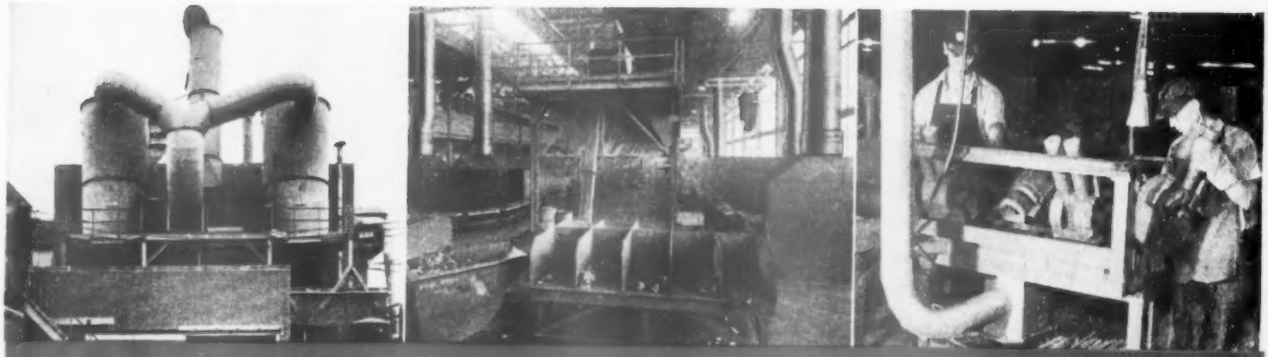
We stock fine needle point flat head brads for attaching tape.

The Freeman Supply Company

Pattern Shop & Foundry Supplies & Equipment

Mahogany and Pine Pattern Lumber

1152 East Broadway TOLEDO 5, OHIO Tel. TAylor 4624



Sand conditioning | Molding | Core Grinding

A Profitable Investment!

CLEANER AIR THROUGHOUT THE FOUNDRY

A most rapidly growing trend in the foundry industry is the extension of dust control to cover all dust-creating operations. Foundries which a few short years ago were content to ventilate the cleaning room and shake-out operations, now have complete Schneible Multi-Wash Dust and Fume Control Systems throughout the foundry.

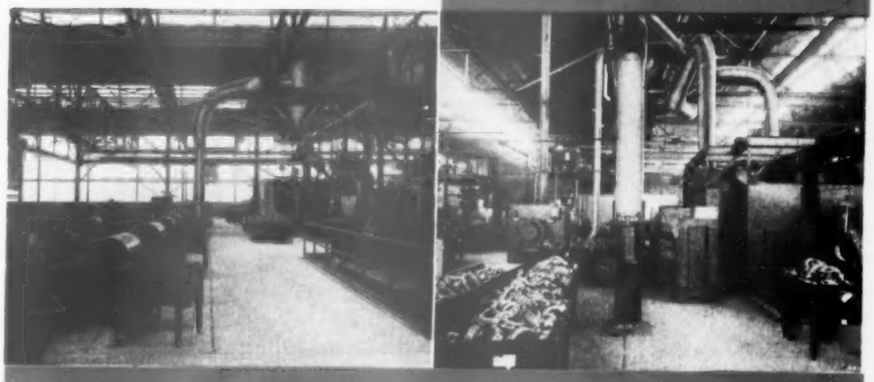
A Schneible system pays dividends in increased human efficiency, aids in attracting and holding better grade labor, and plays a part in lessening rejects and increasing output.

Schneible equipment includes dust collectors, hoods, ductwork and ducting installations required to maintain clean air throughout the foundry — including the continuous removal of dust and fumes from all dust creating zones. These systems give a thorough cleaning of the contaminated air by the Multi-Wash method, separation of the water from the sludge for further use in the collector system, and disposal of the sludge.

Write for informative bulletins and let our foundry-trained engineers suggest the ideal system for your foundry.

CLAUDE B. SCHNEIBLE CO.
2827 Twenty-Fifth St., Detroit 16, Mich.
Engineering Representatives in Principal Cities

Shake-out

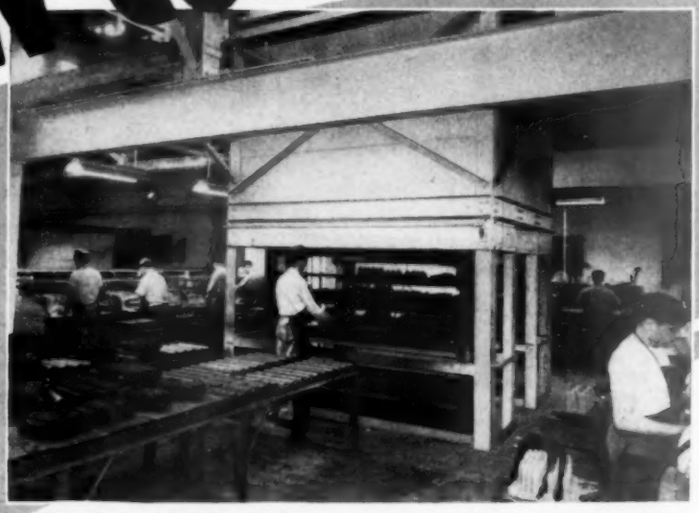


Grinding and Snagging | Casting Cleaning

SCHNEIBLE

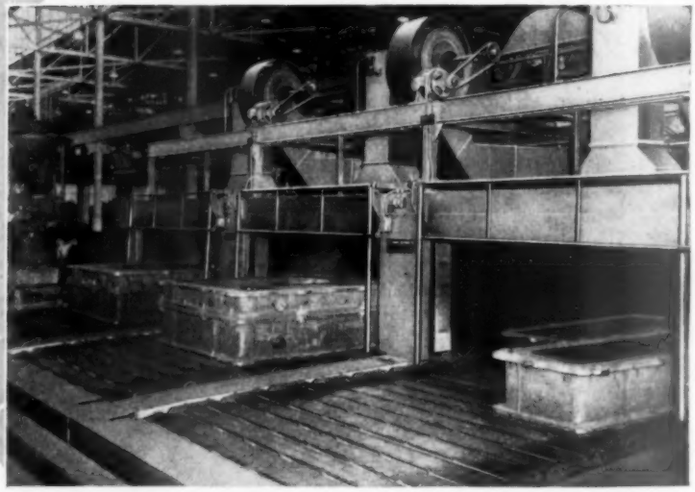
LIQUID-VAPOR INTIMATE CONTACT EQUIPMENT for DUST COLLECTION ABSORPTION CONDENSATION AND TEMPERATURE REDUCTION

COLEMAN CONVEYOR



COLEMAN TOWER OVEN. For high speed baking of medium to small cores. Save floor space, labor and fuel. Patented Open Center permits loading from both inside and outside of Tower and increases loading accessibility by as much as 300% compared with other vertical oven designs.

COLEMAN HORIZONTAL CONVEYOR OVEN. This design offers outstanding advantages in serving core departments employing large numbers of core-makers in production foundries making automotive, agricultural and similar castings.



COLEMAN CONVEYOR MOLD OVENS. For high speed continuous drying of molds. The sensational results produced by these patented ovens have created entirely new conceptions of mold drying speed and dry sand economy in both gray iron and steel foundry operation.

WORLD'S OLDEST AND

COLEMAN
CORE *and* MOLD
OVENS

The **FOUNDRY E**
CLEVELAND 13, O
BUILDERS OF COLEMAN A

R OVENS

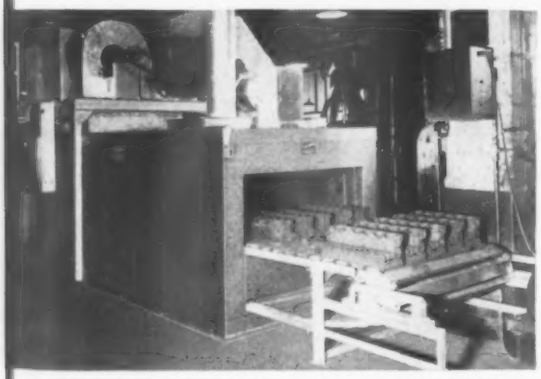
ENGINEERED TO MEET YOUR OWN REQUIREMENTS

Remarkable economies are obtainable with well engineered "mechanical" core baking and mold drying systems, but a successful system requires a proper analysis of requirements by competent and experienced engineers.

Coleman Oven Engineers offer the background of greatest experience in the foundry oven field—and most of the successful continuous oven installations in various types of foundry production are Coleman Ovens.

Coleman Continuous Ovens are built in many different types, each designed to best meet specific operating requirements. They include such designs as Tower Ovens, Horizontal Over-Head Conveyor Ovens, Double-Chain Single or Multi-Pass Conveyor Ovens, Continuous Mold Ovens, Flight-Conveyor Ovens, Combination Vertical and Horizontal Conveyor Ovens, etc.

Investigate now! A Coleman Conveyor Oven of right design may disclose an opportunity for outstanding savings in production costs.



COLEMAN HORIZONTAL FLIGHT CONVEYOR OVEN. For redrying cores and core assemblies after pasting, blacking or washing. Wide range of sizes and capacities.

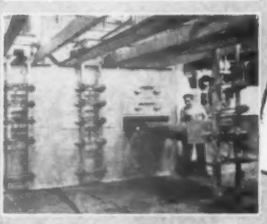
Coleman Ovens are also built in all conventional and special designs to meet every possible requirement in core baking and mold drying. Heating systems can be furnished to use the most economical fuel available in your locality—gas, oil, stoker coal, electricity, etc.

● OVER 9,000 SUCCESSFUL INSTALLATIONS

Write for Folio of Bulletins

LARGEST FOUNDRY OVEN SPECIALISTS

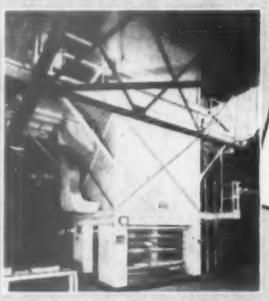
COLEMAN Portable Core Ovens



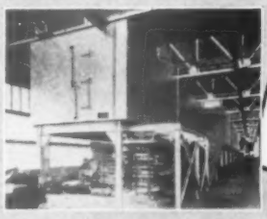
COLEMAN Rolling Drawer Ovens

COLEMAN Transrack Ovens

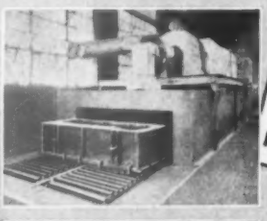
COLEMAN Car Type Ovens



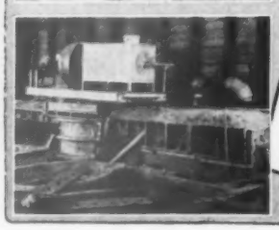
COLEMAN Tower Ovens



COLEMAN Horizontal Conveyor Ovens



COLEMAN Conveyor Mold Ovens



COLEMAN Portable Mold Dryers

RY EQUIPMENT *Company*

D 13, OHIO, U. S. A.

MEMBER

IAN AND SWARTWOUT OVENS

·HIGH SILICON IRON·

JISCO

JISCO SILVERY, a "MUST" in modern foundry practice

Andrew Jackson to His Troops: "We must and will be victorious; but we must conquer as men who owe nothing to chance, and who, in the midst of victory, can still be mindful of what is due to humanity!"

Jisco Silvery Iron, smelted from virgin ores in one of the most modern blast furnaces in America, supplies the necessary silicon in cupola charges containing large percentages of gray iron scrap and steel. The use of Jisco means high quality castings having superior tensile strength, close grain structure and easy machineability.

Jisco also offers to the Foundryman lower production costs through improved metallurgical efficiency. It is a "must" in modern foundry practice.

JISCO METALLURGICAL SERVICE

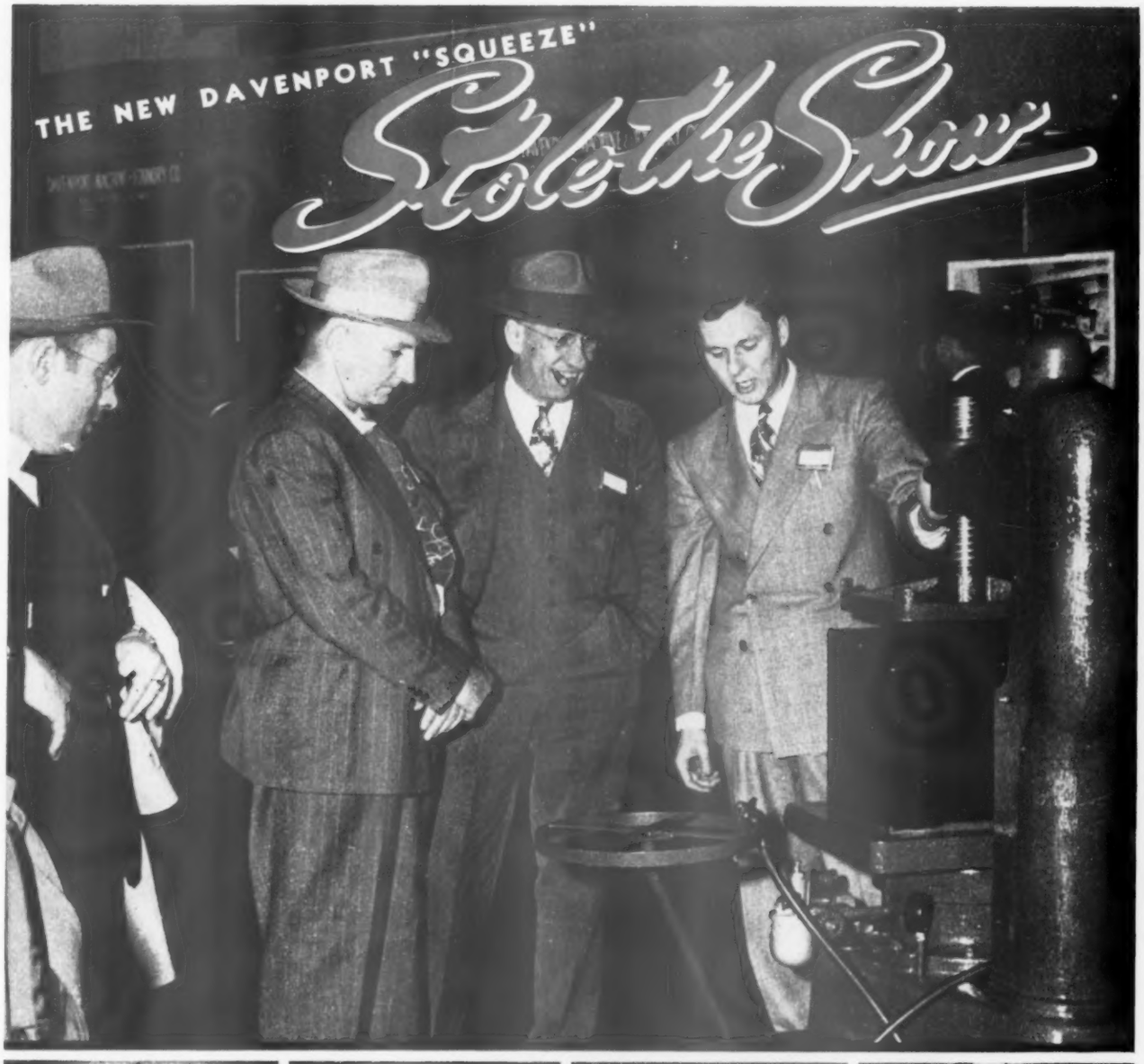
A complete metallurgical department is maintained for the benefit of the foundry industry. There is no cost or obligation.

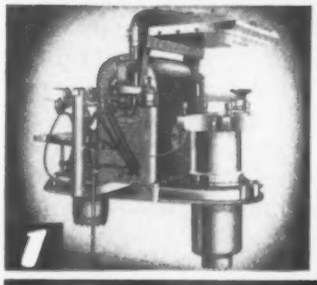
THE JACKSON IRON & STEEL Company

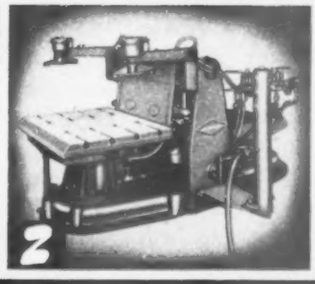
JACKSON, OHIO.

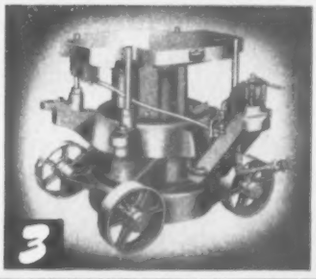
THE NEW DAVENPORT "SQUEEZE"

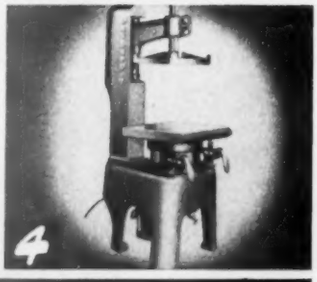
Stole the Show











A Size MOLDING MACHINE for Every FOUNDRY

DAVENPORT
MACHINE AND FOUNDRY CO.
DAVENPORT, IOWA, U.S.A.

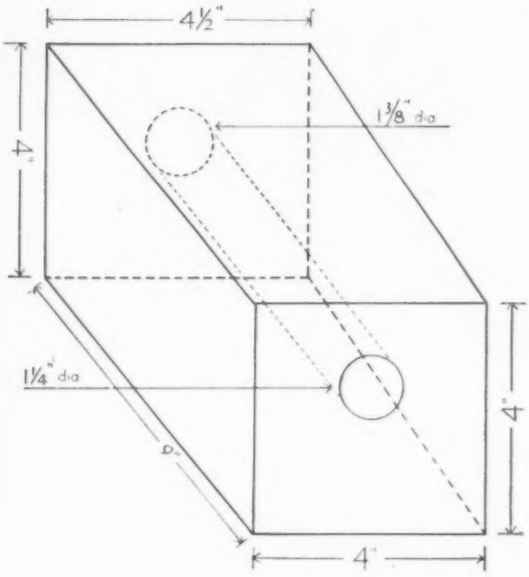
At the 50th A.F.A. Convention the new Davenport Jolt Squeeze stole the show! Both production and jobbing foundry men were delighted with this modern, sturdy, efficient, fast-operating squeeze.

Davenport's line of molding machines has, for over 40 years, been considered the best molding machine equipment available.

We shall be pleased to send you a complete catalog.

CANADIAN REPRESENTATIVES: CANADIAN FOUNDRY SUPPLIES & EQUIPMENT LTD., TORONTO AND MONTREAL

Slag Hole Blocks dependable for Long Runs of Continuous-Pour Cupola



Standard CARBOFRAX Slag Hole Blocks, in commonly called for dimensions shown, are available for immediate shipment. A variety of other sizes can be made to order from stock molds.

Effective elimination of slag hole block failures during a continuous-pour cupola run is insured by using CARBOFRAX silicon carbide blocks.

Particularly resistant to slag erosion at high temperatures, these blocks retain their uniform hole size. No enlargement occurs even while the blast is on. For eighteen—twenty—or as much as twenty-four hours continuous service, the slag stream remains practically constant. Costly delays in shutdowns for slag hole block replacement are avoided.

True to size, CARBOFRAX blocks are easily and speedily installed. No special tools for installation are necessary.

Usually available for delivery from stock, is the most commonly used CARBOFRAX slag hole block specified in the diagram. Other sizes can be made to order. A variety of molds is kept on hand for that specific purpose. Write Department L-76 for prompt reply to detailed questions.

The Carborundum Company, Refractories Division, Perth Amboy, New Jersey.

CARBOFRAX Slag Hole Blocks

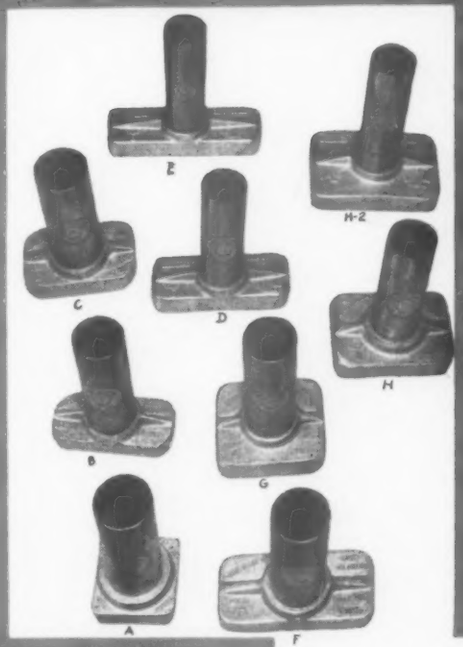
BY CARBORUNDUM

TRADE MARK

"Carborundum" and "Carbofrax" are registered trademarks which indicate manufacture by The Carborundum Company

THE IMPROVED Redford CORE BLOWER
CARTRIDGE BENCH TYPE

FOR EFFICIENT PRODUCTION OF SMALL, INTRICATE CORES



STANDARD SAND CARTRIDGES

The Standard Sand Cartridges are a cast aluminum base into which a seamless steel tubing (2½" or 2⅝" Dia. x 8" long) is pressed. The bottom of the base is closed with an ⅛" cold rolled steel plate, in which holes are to be drilled to match the blow-holes of the core box.

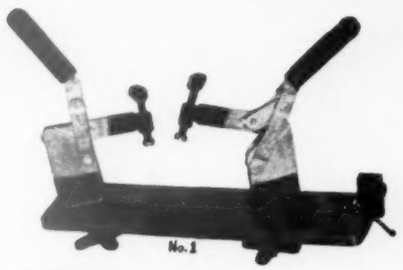
SIZES	WIDTH—LENGTH	PRICE
A	3⅜ x 3⅜	$10.00
B	2¼ x 5¼	11.00
C*	3 x 5⅛	11.00
D	2⅛ x 7⅛	12.00
E	2⅜ x 8⅜	12.00
F	3 x 7⅛	14.00
G	4⅜ x 5⅛	14.00
H	4⅜ x 6⅜	13.00
H2	4⅜ x 7⅛	13.00

To find outside dimensions, add ⅛" to width and length of inside dimension.

Special size Sand Cartridges furnished upon application.

*This size adaptable to a large range of core boxes.

1. Core Box Clamping Attachment for blowing vertically split core boxes. (On end)
2. Core Box Drawing Attachment—used with No. 1 for drawing difficult cores.
3. Vibrator and Knee Valve — air or electric furnished with No. 2.



WHAT USERS SAY

Enclosed check $295.00, which we send with pleasure. We thank you for your interest and print on this core, which was blown perfectly as per your instructions. An additional order is placed for 550 more castings and we will consider the machine paid for.

We purchased a Redford cartridge bench core blower eight months ago and in that time we have saved its cost many times in labor savings.

An experienced core maker is not necessary to operate it efficiently.

It is adaptable to all small work and easy to set up.

The relatively small commission you will make from the sale of this core blower will never free you from the necessity of working like hell to make a living. However, if everything you sell gives the same service and satisfaction that this core blower is giving us, you will inevitably obtain such freedom, but soon.

Being so pleased with our Redford Cartridge Bench Core Blower, we feel that this information should be passed along to you.

The initial investment being so small, it was no time when the blower paid for itself. Production increased tremendously and because of the wide range even short runs are being blown.

*Names of these endorsers furnished upon request

PRODUCES SMALL, INTRICATE CORES WITH REMARKABLE SPEED AND SIMPLICITY

Quickly and economically installed. Does not require a large volume of air—½ c f.m is sufficient.

A ¾ inch air line with 80 to 120 lbs. pressure is ample to make cores in single or gang boxes requiring a maximum of 2 lbs. of sand.

To blow core boxes of different height, shape or size, adjustments may be made instantly by the operator.

The Improved REDFORD Core Blower, Cartridge Bench Type, has an arm support column at the rear which provides an air reservoir to give additional volume of air per blow. Blow gun at base of column assures dry air at all times. All condensation in reservoir may be removed when using blow gun.

Sand Cartridges are made a part of the core box equipment. The base of a cartridge is determined by the blowholes in the box. However, one cartridge may be used for several core boxes of approximately the same size. The cylindrical part of the cartridge must be high enough from the base to hold sufficient sand to fill the core box once.

Write for Folder and "Seven Facts" regarding core blowing

REDFORD IRON & EQUIPMENT COMPANY

PHONE: REdford 8610

21315 WEST McNICHOLS ROAD DETROIT 19, MICHIGAN

Banish trouble with a POP-OFF*

HINES "Pop-Off"*

*Trademark. Fully protected by U.S. and foreign patents and patents pending.

HINES POP-OFF (Trademark Reg. U. S. Pat. Off.) FLASK

Here is another Hines "Pop-Off" Flask at work boosting production and lowering costs. Thousands more are repeating this performance all over the world.

EXCLUSIVE MANUFACTURERS OF "POP-OFF" FLASKS AND JACKETS

THE HINES

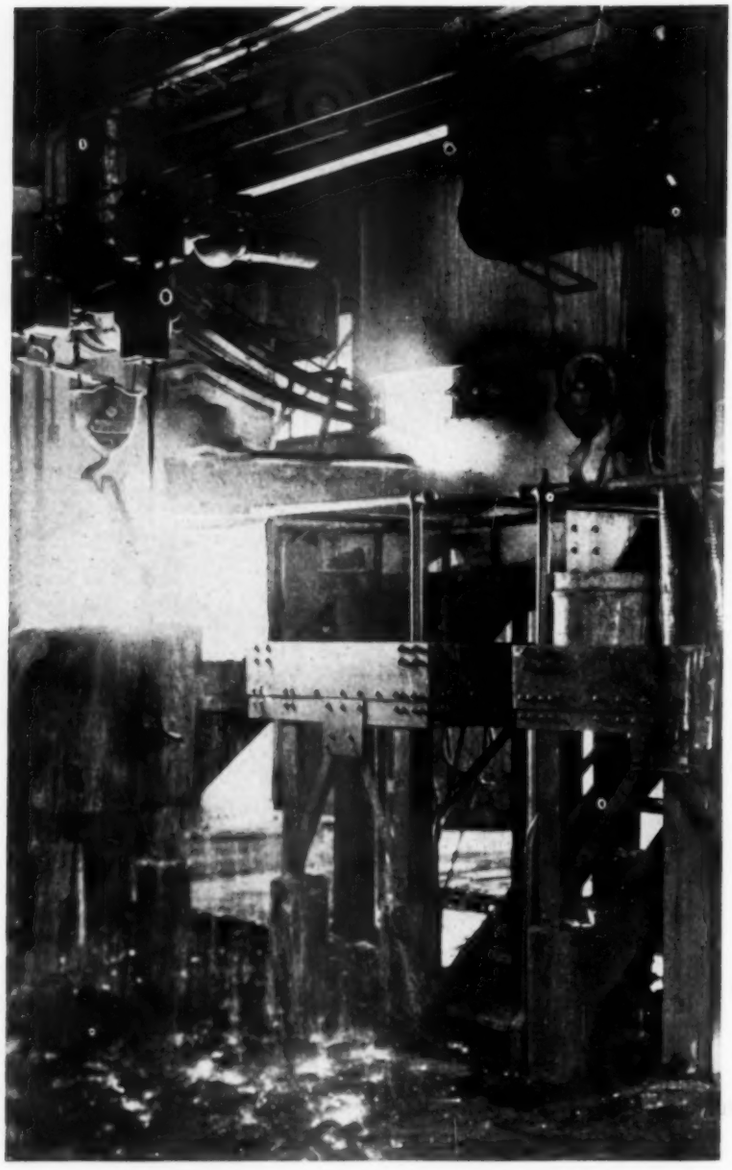
3431 WEST 140th ST.

FLASK

FLASK CO.

CLEVELAND 11, OHIO

IRONTON CARO-LINE



THE SILICEOUS RAMMING REFRACTORY FOR GRAY IRON MALLEABLE AND STEEL FOUNDRIES

"Ironton Caro-Line" Siliceous Ramming Refractory is now being used successfully in gray iron and malleable foundries, for ladle linings and for rammed in breasts and slag holes. It gives from 3 to 5 times more service than ordinary ladle lining materials.

It is highly refractory, has unusual resistance to metallic oxides, gives cleaner iron and reduces the loss of castings due to slag inclusions. It is easy to install and your operators will like it.

May we send one of our service men to tell you about this refractory material?

THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON OHIO

Motive Type Speedslinger equipped with Timken Bearings at positions indicated.

TIMKEN BEARINGS help speed up the *Speedslinger!*

Tapered Roller TIMKEN BEARING EQUIPPED

The Speedslinger is the modern mechanical method of sand ramming on molds for all kinds of castings—small and large. It not only does a faster job but also a better job. It has superseded hand ramming in many large production foundries. The manufacturer, the Beardsley and Piper Co., Chicago, states that the Speedslinger can deliver and ram 1,000,000 pounds of sand in 8 hours at an average cost of 3 cents for every 10 cubic feet of sand — as compared to $1.00 for hand filling and air ramming.

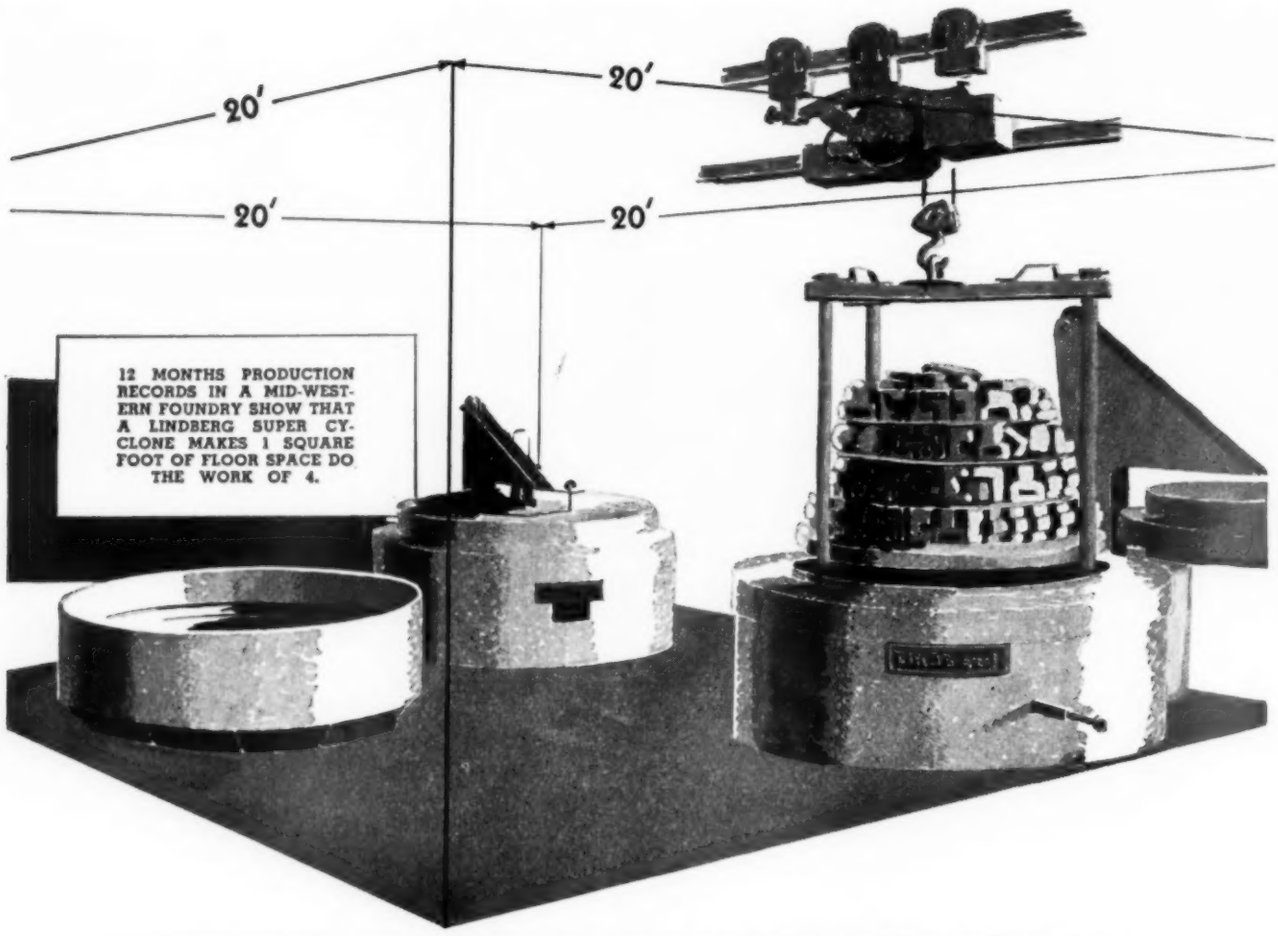
Timken Tapered Roller Bearings are applied at the two main centers of movement in filling and ramming, where their versatility in eliminating friction; carrying radial, thrust and combined loads; and holding moving parts in alignment helps to provide maximum operating speed and smoothness, simplify lubrication, reduce maintenance, increase endurance and lengthen machine life.

Any machine is a better machine when equipped with Timken Roller Bearings; better from every standpoint including performance and economy. To make sure of getting genuine Timken Bearings however, look for the trade-mark "TIMKEN" on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

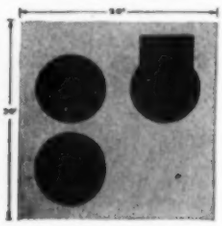
TAPERED ROLLER BEARINGS


20′
20′
20′
20′
12 MONTHS PRODUCTION RECORDS IN A MID-WESTERN FOUNDRY SHOW THAT A LINDBERG SUPER CYCLONE MAKES 1 SQUARE FOOT OF FLOOR SPACE DO THE WORK OF 4.

HOW YOUR HEAT TREAT DEPARTMENT WILL PRODUCE 4 TIMES MORE PER SQUARE FOOT OF FLOOR AREA!

Are your heat treating requirements increasing? Do you have to increase your output—without using more floor space? Consider the Lindberg Super Cyclone! The production records for a period of twelve months in a mid-western foundry show that a Lindberg Super Cyclone makes one square foot of floor space do the work of four.

200 TONS MONTHLY IN 20′ BY 20′ AREA



48″ by 48″ Super Cyclone installation which includes insulated cooling pit, quench tank, and loading space, normalizes in only 400 square feet of floor space, as much work as a conventional car type furnace, requiring 1530 square feet in same plant.

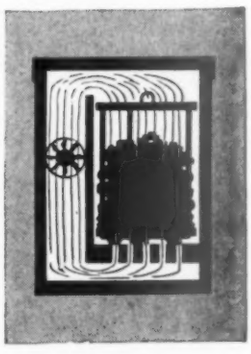
MINIMUM HANDLING

Castings are loaded away from the furnace on fixtures or in work baskets. This method of handling improves working conditions for the heat treater, as loading and unloading is done away from furnace heat.

FORCED CONVECTION HEATING

The Super Cyclone produces more work because heat is blown through and around every part of the charge. A powerful blower fan does the job quickly,—and gives accuracy of heating never before obtained in production heat treating. Accurately heated air is forced to the center of the charge as well as to all other portions,—therefore nothing lags. No overheating of outside and underheating of middle. Every casting is heated alike.

Because of the forced convection principle, quick and controlled cooling is easily accomplished.

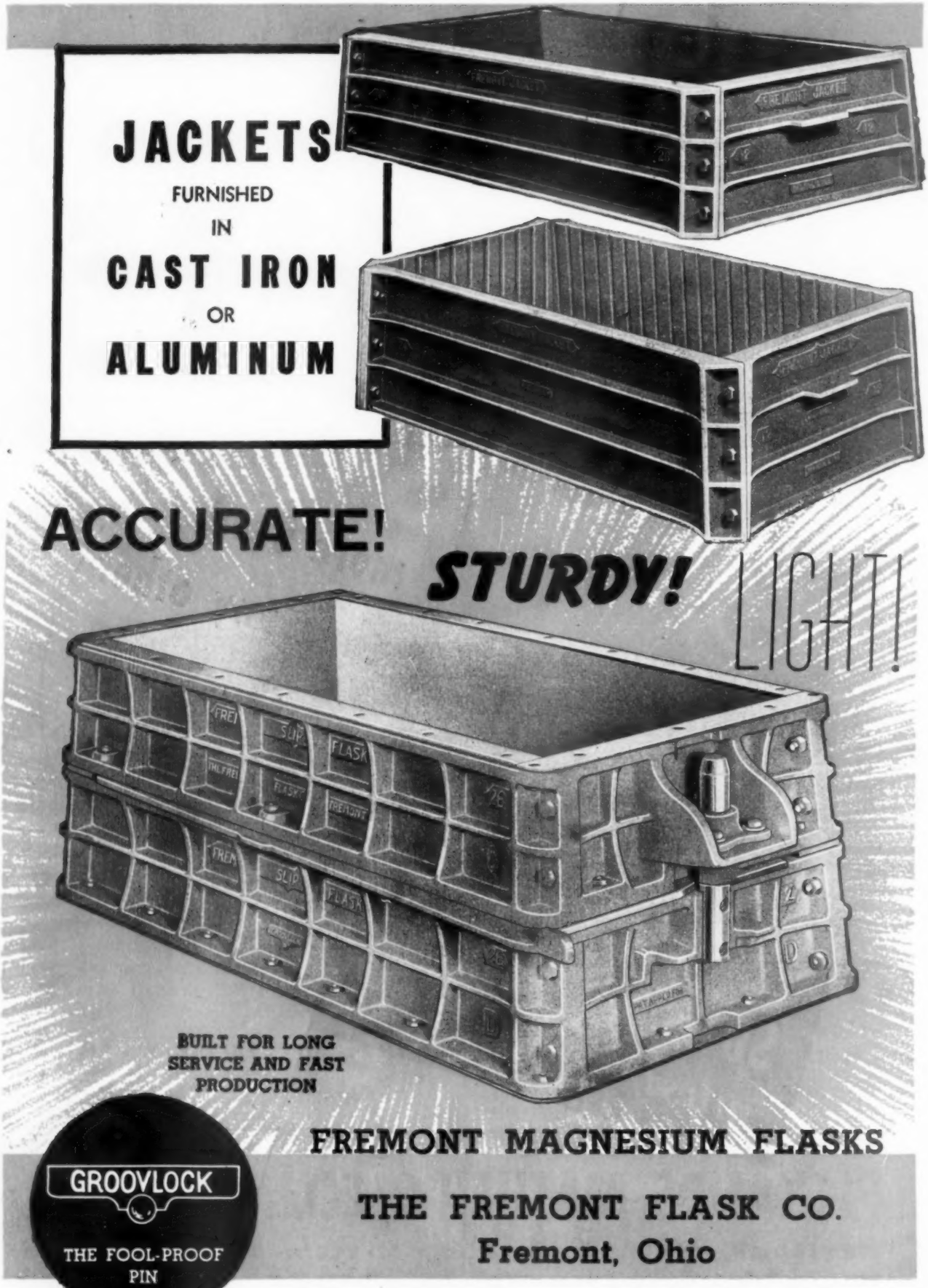


LINDBERG ENGINEERING CO.
2453 West Hubbard Street, Chicago 12, Illinois

Write for the 8 page bulletin No. 130, "Lindberg Super Cyclone"

LINDBERG FURNACES

MELTRITE
more used
than any other
merchant
pig iron...
P M
Such preference
must be merited
PICKANDS MATHER & CO.
CLEVELAND • CHICAGO • DETROIT • ST. LOUIS
ERIE • DULUTH • MINNEAPOLIS • TOLEDO
• IRON ORE
• PIG IRON
• COAL
• COKE

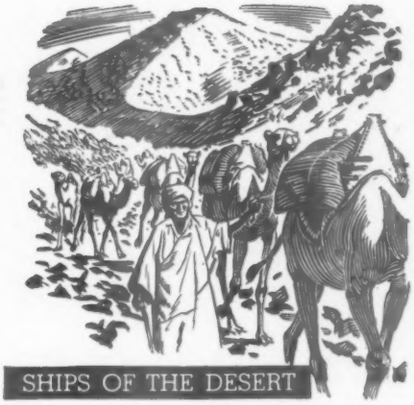

JACKETS
FURNISHED
IN
CAST IRON
OR
ALUMINUM
ACCURATE!
STURDY!
LIGHT!
BUILT FOR LONG
SERVICE AND FAST
PRODUCTION
GROOVLOCK
THE FOOL-PROOF
PIN
FREMONT MAGNESIUM FLASKS
THE FREMONT FLASK CO.
Fremont, Ohio

ONE OF A SERIES OF STORIES ABOUT ALLOYING METALS . . . WHERE THEY COME FROM AND HOW THEY ARE USED

THE STORY OF CHROMIUM

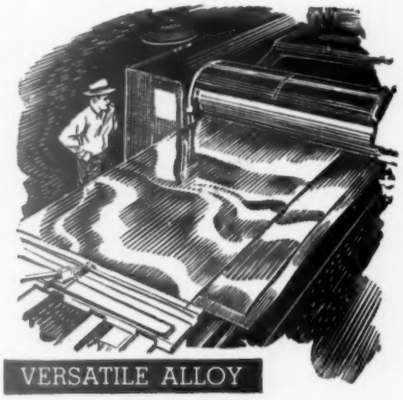
COLOR FOR ARTISTS

The yellows, blues, and violets of the artist's palette; the red of the ruby, the green of the emerald — all come from chromium, a metal named from the Greek word *chroma*, meaning color. Discovered in 1797, this metal was for years just a laboratory curiosity, but is now top-ranking among alloys.



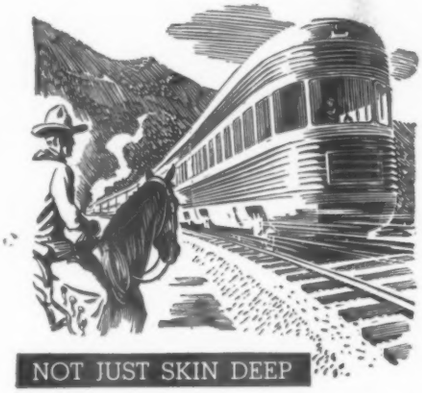
SHIPS OF THE DESERT

Caravans of camels laden with chromite ore have often formed the first link on an assembly line thousands of miles long. From the mines of Rhodesia, Turkey, Russia, and India this valuable ore starts its long journey to Electromet furnaces, where dozens of different types of chromium alloys are produced.



VERSATILE ALLOY

This silvery-white metal, used with steel and iron in amounts from 1 to 35 per cent, imparts many of its own desirable properties. To stainless steels, chromium gives resistance to heat, rust, and corrosion—to heat-treated steels, strength and resistance to shock—to cast iron, hardness and wear resistance.



NOT JUST SKIN DEEP

The luster of stainless steel withstands all weather conditions—on streamlined trains as well as on skyscrapers. For hospital, food, and dairy equipment, too, this steel is popular, since it is so easy to clean and sterilize. And for the oil and chemical industries, its resistance to corrosion and heat makes it ideal.

BEARINGS TO BATTLESHIPS

Axles and armor plate, dies and drills, shafts and springs — these are made from engineering steels that must have the hardness and strength necessary to withstand wear and strain. That's why engineers specify steels with 1 to 3 per cent chromium for applications where dependability is essential.

It's Been A Long Time

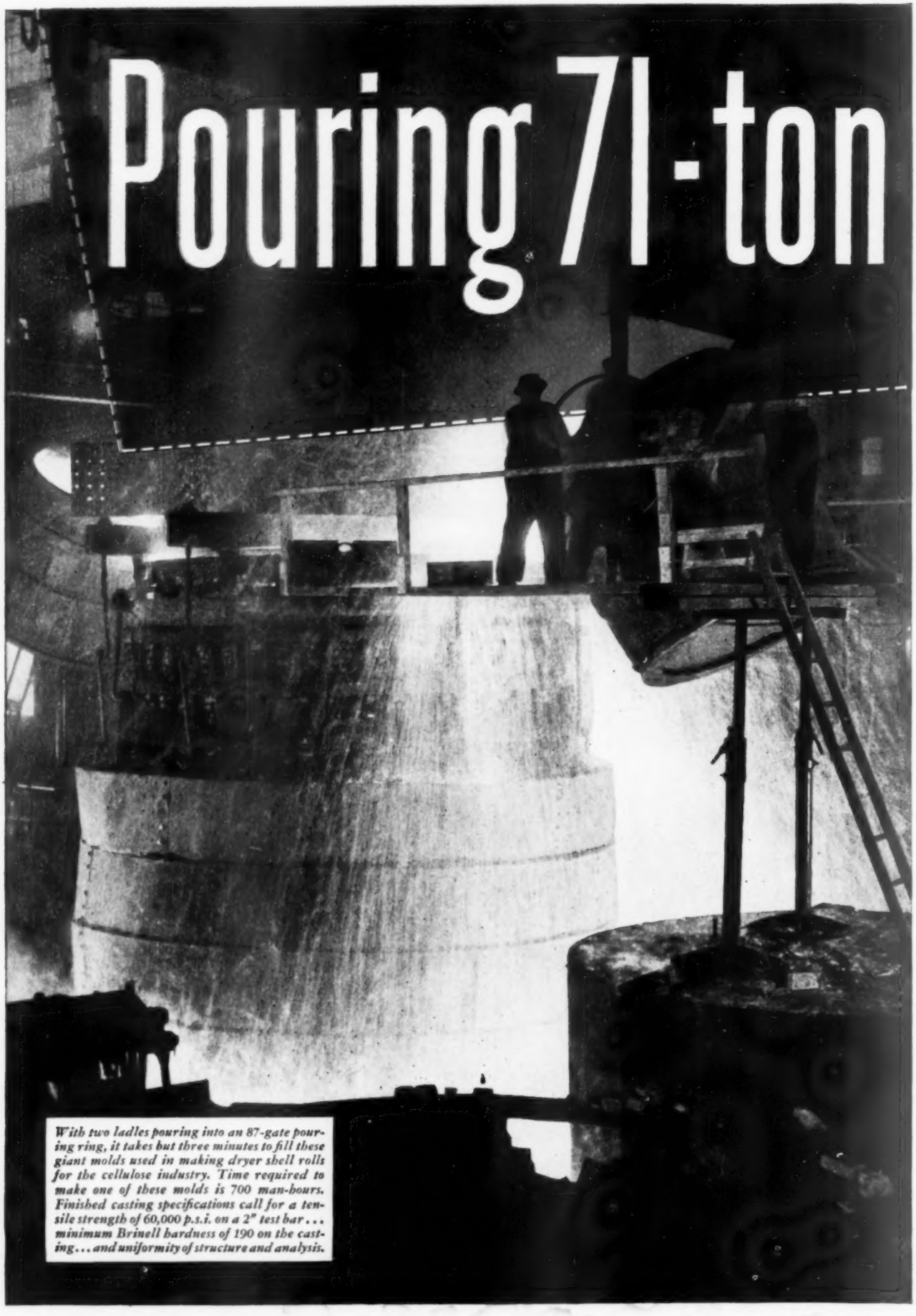
. . . since Electromet started to produce ferro-alloys — 40 years ago. In fact, as far back as 1897, a plant in Virginia, which later joined Electromet, was the first to produce ferrochrome commercially in the United States. Electromet is constantly developing new and better alloys, among them the low-carbon ferrochrome essential in the production of stainless steels. You will learn more about chromium and other alloys by writing to our Technical Service Department for the booklet, "Electromet Ferro-Alloys and Metals."

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

ELECTROMET Ferro-Alloys and Metals are sold by Electro Metallurgical Sales Corporation, and Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Electromet
TRADE-MARK
Ferro-Alloys & Metals

Pouring 71-ton



With two ladles pouring into an 87-gate pouring ring, it takes but three minutes to fill these giant molds used in making dryer shell rolls for the cellulose industry. Time required to make one of these molds is 700 man-hours. Finished casting specifications call for a tensile strength of 60,000 p.s.i. on a 2" test bar... minimum Brinell hardness of 190 on the casting... and uniformity of structure and analysis.

dryer shell castings

in three minutes with Republic CHATEAUGAY

Here's a man-sized casting job—a tribute to the casting skill of one of America's leading foundries—a credit to Republic CHATEAUGAY, the pig iron used in making these giant dryer shell rolls.

Why is CHATEAUGAY used? First, because this foundry discovered that CHATEAUGAY is the *only* iron which meets its rigid chemical specifications for this job. Second, because CHATEAUGAY *always* contains an even, complete distribution of chemical elements . . . never contains a concentration of graphite or other components. And third, because CHATEAUGAY is the one iron that will meet the strict physical requirements established for the finished castings.

Whenever you have a problem of improving casting quality, lowering unit casting costs, or meeting tougher than average physical specifications, it will pay you to try Republic CHATEAUGAY—the low-phosphorous, copper-free iron which consistently out-performs other irons.

Complete information on request. Write to:

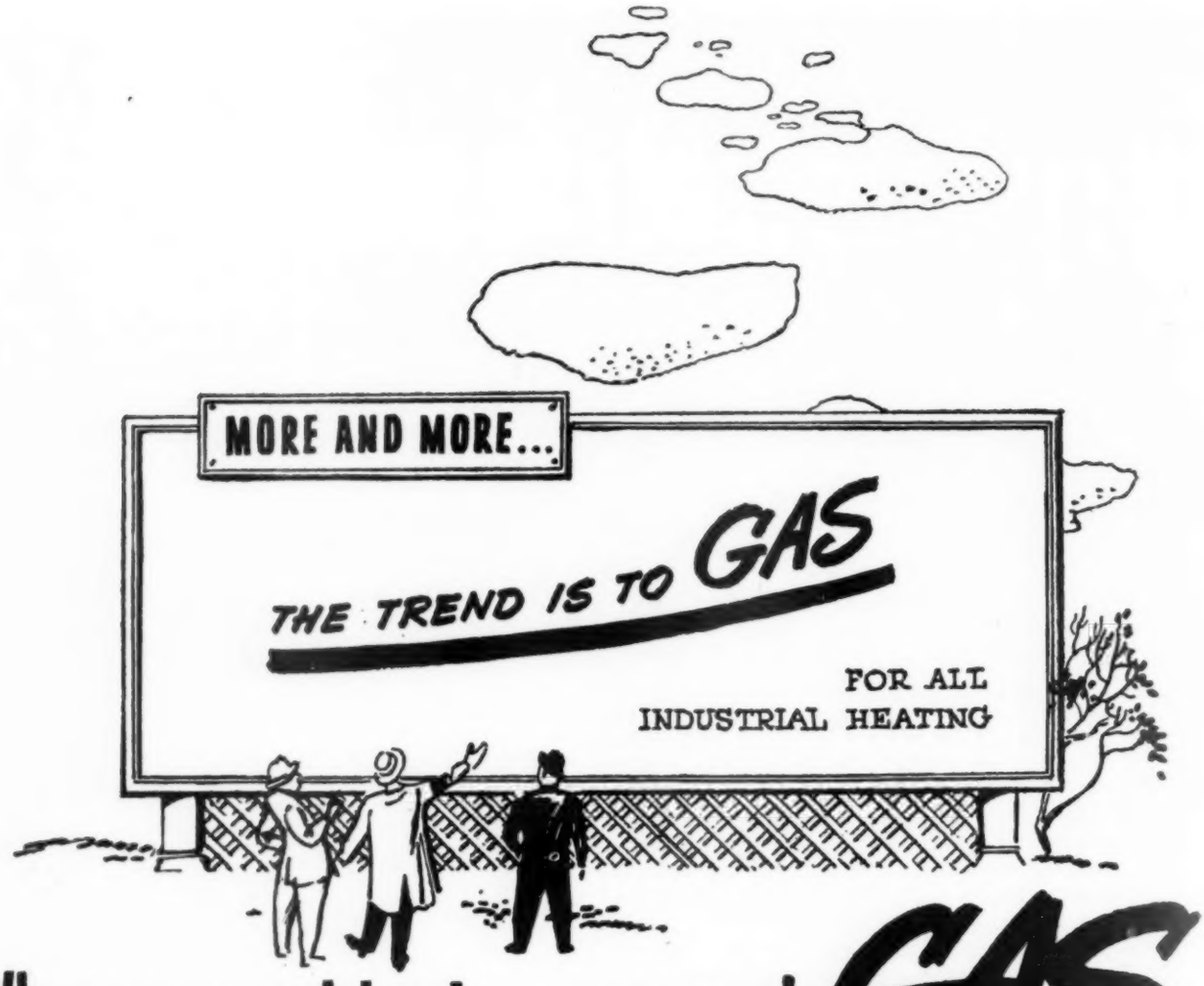
REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Bldg., New York 17, N. Y.

Extensive machining of dryer shell castings on this 40' boring mill calls for top machinability—one of the many plus qualities of CHATEAUGAY Pig Iron.

Republic PIG IRON

"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC CORE WIRE • FOUNDRY NAILS



When you need heat....you need GAS

More and more "The Trend is to GAS" for the difficult heating jobs of industry. More and more, GAS and modern Gas equipment fulfill the exacting specifications set up by engineers and production executives for all industrial processes requiring heat.

On every count, in comparison with other heat sources, GAS is the ideal heating medium. Wherever heat is required in manufacturing processes, there's a job for GAS. Characteristics of GAS—features of importance to management—include:

- Flexibility
- Cleanliness
- Rapid Heating
- Economy of Operation
- Precise Controllability
- Dependability
- Versatility of Application
- Labor-Saving Automatic Regulation

Your local Gas Company will send an Industrial Representative to explain why:

When You Need Heat—You Need GAS.

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE NEW YORK 17, N. Y.

Eliminate DUST

Mahon HYDRO-FOAM Collector Does it the Logical, Effective Way— Deposits ALL Dust Safely Under Water

The Mahon Hydro-Foam Collector will solve your dust problem permanently and economically . . . it is a standard unit which is manufactured in various capacities. These standard units can be manifolded together in batteries of two, three or four to a common sludge tank, and multiple batteries may be employed to handle any amount of air or any dust condition. Even the most minute particles of dust are effectively removed from the air and trapped under water . . . an automatic sludge removing device, which keeps the sludge tank clear, completes the simple process of dust elimination . . . a completely automatic system requiring less attention and less service. Have a Mahon engineer analyze your Dust problem today, and explain in detail the advantages and the effectiveness of the patented Hydro-Foam principle.

Address INDUSTRIAL EQUIPMENT DIVISION

THE R. C. MAHON COMPANY

Detroit 11, Michigan • Western Sales Division, Chicago 4, Illinois

Engineers and Manufacturers of Dust Collecting Systems, Complete Finishing Systems, Annealing Ovens, Core Ovens, and many other Units of Special Production Equipment.

On this page are shown batteries of two and three Mahon Hydro-Foam Dust Collectors. The illustration shows 24 grinders served by a Mahon Hydro-Foam System which handles 725,000 cubic feet of air per minute.

MAHON

This Maehler unit...

replaced { 4 car-type, coke-fired ovens / 1 drawer-type oven

The Maehler unit shown above, installed at the Harnischfeger Corporation in Milwaukee, Wisconsin is a double compartment four rack Lift Door Core Oven with an oil-fired automatically controlled airheat system. Doors are equipped with new electrically-operated lift. Push buttons to operate the doors are mounted on flexible extension brackets to front of oven, permitting lift truck operator to open doors while guiding truck into position for loading core racks into oven.

WHEN THE Harnischfeger Corporation of Milwaukee, Wisconsin modernized its facilities for core baking, the Maehler Lift Door Core Oven shown above was installed . . . The results were typical . . . the Maehler unit did a faster and more thorough core baking job . . . a job that enabled it to replace four car-type, coke fired ovens and one drawer oven! This meant a substantial cut in production costs as well as better-baked cores.

The new Maehler oven, a four rack, double compartment oven with an oil-fired automatically controlled airheat system, handles four 5 ft. 6 in. x 5 ft. 6 in. x 5 ft. adjustable racks. After installation the core baking schedule of the oven was two bakes per day on small and medium size cores. Larger cores were baked overnight. Total weight of cores per bake is approximately 8,000 to 10,000 pounds.

For *better* cores, baked faster and at lower cost . . . plan now to install a Maehler Core Baking Oven in your plant.

MAEHLER

Industrial Ovens and Furnaces for Core Baking, Mold Drying, Heat Treating, Enameling, etc.

THE PAUL MAEHLER COMPANY

2200 W. LAKE ST. • CHICAGO 22, ILL.

Federated — MODERN HEADQUARTERS FOR NON-FERROUS METALS

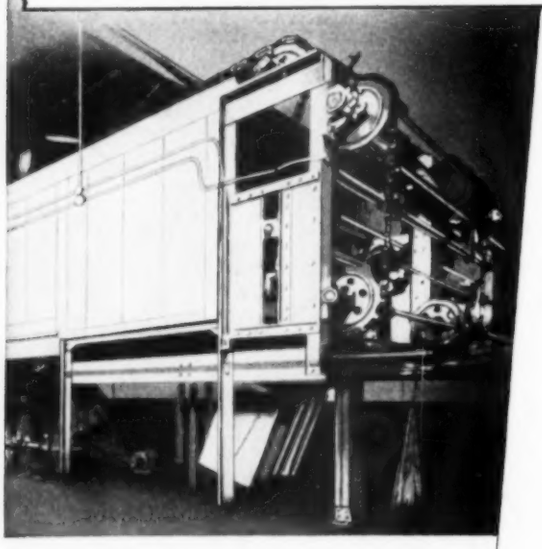
SMELTING—In the early days, furnaces were like Topsy, "they just growed". In Federated, furnace design is based on sound and tried engineering principles. Besides this, scientific instruments are used to control the operation of the furnace so that human failures can be minimized. Even more important is the metallurgical control and precise refining practice exercised while the metal is being processed. Each step in the process is carefully checked by trained metallurgists so that you may be assured of a top quality product. The aluminum furnace illustrated is typical of the modern smelter. Streamlined and provided with ventilating equipment, it has a capacity of 70,000 pounds each day.

FMD
Federated

FEDERATED METALS DIVISION
American Smelting and Refining Company
120 Broadway, New York 5, N. Y.
Nation-wide service with offices in principal cities

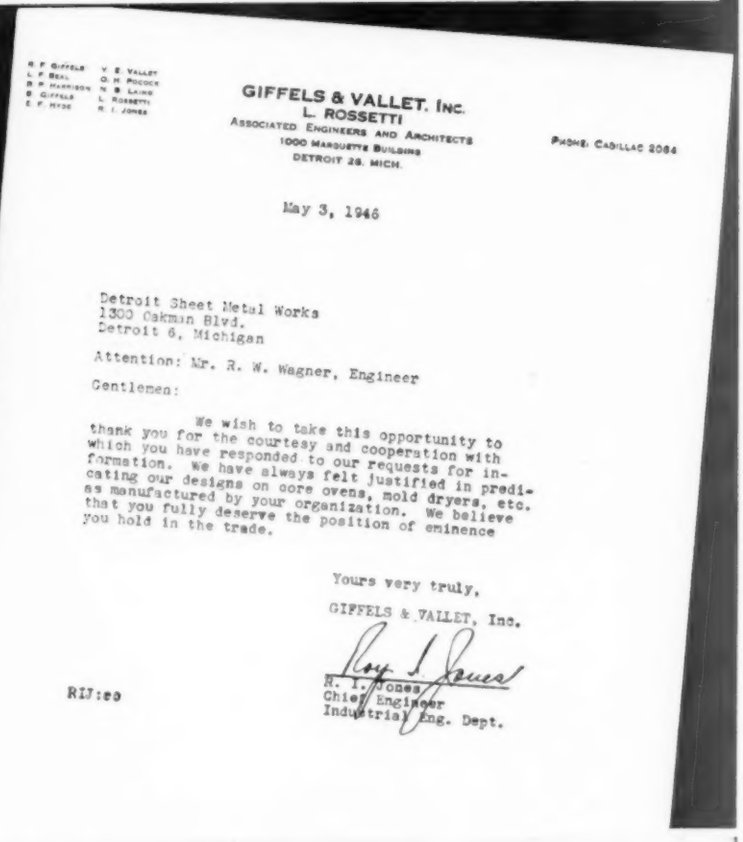
ALUMINUM • BRASS • BRONZE • BABBITT • DIE CASTING ALLOYS • SOLDER • TYPE METAL • ZINC DUST

"courtesy and cooperation"



A LARGE D.S.M. Continuous Japanning oven installed in one of the leading automotive plants in this country. It bakes the priming coat on automobile hoods.

DETROIT SHEET METAL WORKS
1270 Oakman Boulevard
DETROIT 6, MICHIGAN



GIFFELS & VALLET, Inc.
L. ROSSETTI
ASSOCIATED ENGINEERS AND ARCHITECTS
1000 MARQUETTE BUILDING
DETROIT 26, MICH.

PHONE: CADILLAC 2084

May 3, 1946

Detroit Sheet Metal Works
1300 Oakman Blvd.
Detroit 6, Michigan

Attention: Mr. R. W. Wagner, Engineer

Gentlemen:

We wish to take this opportunity to thank you for the courtesy and cooperation with which you have responded to our requests for information. We have always felt justified in predicating our designs on core ovens, mold dryers, etc. as manufactured by your organization. We believe that you fully deserve the position of eminence you hold in the trade.

Yours very truly,

GIFFELS & VALLET, Inc.

R. I. Jones
Chief Engineer
Industrial Eng. Dept.

RIJ:eo

DETROIT SHEET METAL WORKS

DETROIT -6- MICHIGAN

. . . another foundry reports:

Better Castings, faster, at lower costs

with our SIMPSON Model 1-H MIXER

THE RELIANCE FOUNDRY CO.
GRAY IRON & SEMI-STEEL CASTINGS
500-520 EAST FRONT STREET
CINCINNATI 2, OHIO
March 26th., 1946

MEMBERS
GRAY IRON FOUNDERS' SOCIETY
AMERICAN FOUNDRYMEN'S ASSOCIATION
NATIONAL FOUNDERS' ASSOCIATION
OHIO MANUFACTURERS ASSOCIATION

Mr. Bruce L. Simpson, President
National Engineering Co.
549 West Washington Blvd.
Chicago, Ill.

Dear Mr. Simpson:

About a year ago we installed a No. 1 MODEL H, SIMPSON INTENSIVE MIXER for mulling our facing sand.

We are making a variety of work for exacting machine tool castings buyers from medium to large gray iron castings. One of our principal requirements is very smooth finish for all castings. Previously we had prepared our facing sand by cutting it over by hand and then putting it through a combination screen and aerator.

Immediately after beginning the use of mulled facing sand from the Simpson Mixer we noticed a definite improvement in the appearance of our castings and because of the improved finish our cleaning force was reduced by more than 20%. There was also a noticeable decrease in the number of grinding wheels used.

The use of mulled sand also speeds up the molding since the sand is more uniform in strength and moisture thus there is less patching and finishing required.

We are glad to be able to tell you of the advantages we have enjoyed in the use of this machine.

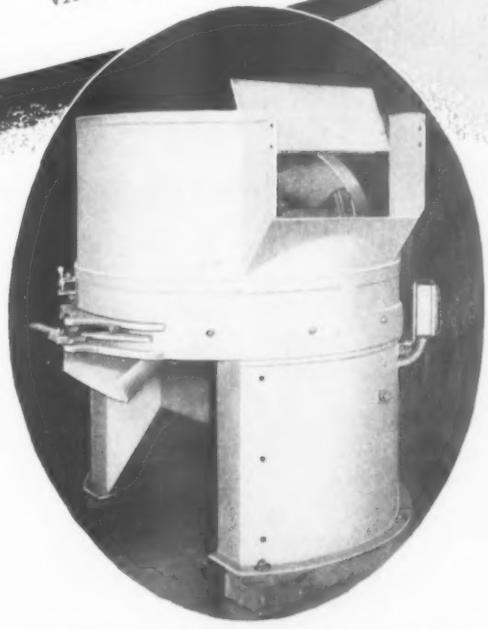
Very truly yours,

F. E. HUTCHINSON
Vice Pres. & Gen. Mgr.

FEHjb.

The Simpson No. 1-H Mixer is very popular equipment in the many foundries that have them—and foundrymen are glad to write and give us the reasons why. (Read the letter at the left.) At Reliance Foundry, for example, Mr. F. E. Hutchinson, Vice Pres. & Gen. Mgr., says when their No. 1-H began operation they noticed an immediate improvement in castings appearance. Cleaning time was reduced and less grinding wheels used. Greater uniformity in strength and moisture eliminated much patching and finishing, thus increasing molding speed.

Reliance likes their 1-H Simpson Mixer, and we believe that it has advantages to offer every smaller foundry for general use or in side floor and core room operations of larger foundries. Ask a National Engineer to discuss the details with you.



AT RELIANCE

This is the Simpson 1-H Mixer that does a good job for Reliance. It handles 4 to 5 cu. ft. of sand without spillage: Built to the same high standards as the larger Simpson Mixers, it employs the same "mulling" principle of mixing. The 1-H has a dust enclosure, integral unit drive and motor, is designed for floor loading. Being portable, it is ideal for special as well as standard operations for side floor, core room or general molding.

SEND FOR THIS . . .

Bulletin giving complete details of the Simpson Model 1-H Mixer.

NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING • CHICAGO 6, ILLINOIS

MANUFACTURER'S FOUNDRY EQUIPMENT ASSOCIATION, INC.

Manufacturers and Selling Agents for Continental European Countries — The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia — August's Limited, Halifax, England. For Canada — Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand — Gibson, Battle & Co., Pty., Ltd., Sydney, Australia

foundrymen

find

A-O heat gloves the last word in comfortable protection

This heavy-duty heat glove (5X166) is made from chrome-tanned, heavy-weight split horsehide leather, carefully selected for its long-wearing and heat-resistant qualities. The excellence of the stock and scientific construction reduce materially the possibility of shrinking. Full lining absorbs perspiration and affords additional protection against heat. Your nearest A-O Safety Representative can supply you.

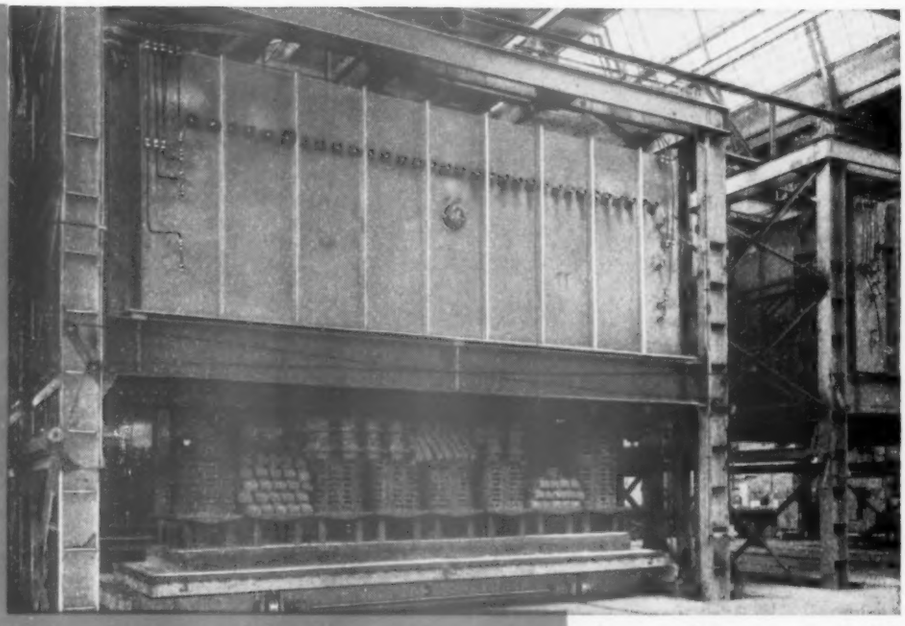
A-O Safety Goggles Safeguard the Eyes of Industry.

American Optical COMPANY *Safety Division*

SOUTHBRIDGE, MASSACHUSETTS

Branches in Principal Industrial Cities

THIS MODERN FOUNDRY INSTALLED 12 ELECTRIC FURNACES



Large castings may be loaded directly on the car, while small ones are usually placed in long-life cast-alloy containers. Electric furnaces promote better working conditions by making the annealing room as clean as any factory.

To Obtain These Annealing Advantages

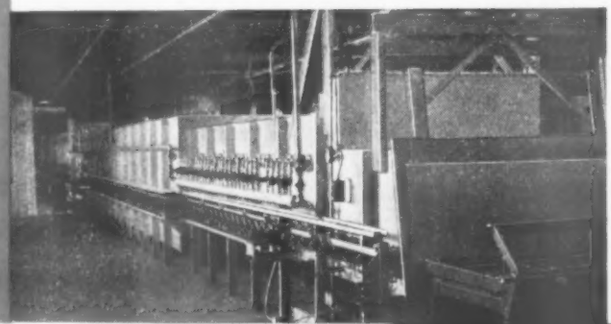
1. **LOW OPERATING COST**—You can keep over-all production costs low with electric furnaces. These costs include such factors as: heat source, subsequent cleaning and machining of parts, transportation to and from furnace, maintenance, continuity of service, etc. In addition, they are compact, saving floor space, and they improve working conditions.

2. **UNIFORM HIGH QUALITY OF ANNEAL**—The accurate control of temperature, atmosphere, and heat distribution possible in an electric furnace assures consistent, uniform, high-quality production.

3. **SHORT-TIME CYCLE**—The normal annealing cycle is materially reduced by arranging the high- and low-temperature furnaces in teams of two.

4. **CONTINUITY OF SERVICE**—General sturdy construction and long-life heating equipment of G-E furnaces keep shut-downs to a minimum.

5. **ATTENDANCE AND SUPERVISION MATERIALLY REDUCED**—Regulation of the heating and cooling cycle is completely automatic.



Where a condition in annealing production warrants a continuous furnace, a G-E roller-hearth electric furnace with automatic charging and discharging and automatic time and temperature control is recommended.

World's largest installation of electric elevator furnaces, at Lake City Malleable Inc., Ashtabula, Ohio

● When Lake City Malleable Inc., found it necessary to build a new plant to meet war-time orders, they installed 12 G-E elevator furnaces to help with the job of producing high-quality annealed malleable iron in large quantities. The furnaces are arranged in six groups, each group consisting of a high-temperature and a low-temperature furnace—a combination which shortens the annealing cycle and eliminates the necessity for any cooling and subsequent heating of the high-temperature furnace.

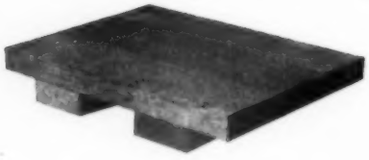
Appreciable savings in over-all floor space are possible with the elevator type furnace construction. Loading capacity usually varies from 16 to 20 net tons per car. Automatic control provides complete and accurate regulation of the heating and cooling cycle.

If you are interested in obtaining these advantages for your foundry, you can get more detailed information on G-E equipment from our heating specialist in the nearest major city, or by writing to the General Electric Co., Schenectady 5, N. Y.

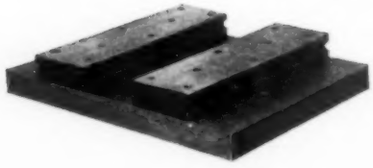
GENERAL ELECTRIC

675-129:8708

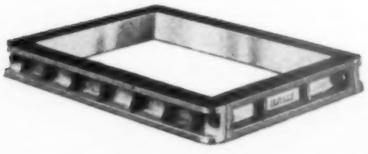
Everything you nee
PEAK PRODU



Cherry Snap Flasks
Cherry Slip Flasks
Aluminum Slip Flasks
Easy-Off Flasks
Cherry Presser Boards
Wood Bottom Boards
Steel Bottom Plates



For the highest quality in foundry equipment specify "ADAMS"



THE ADAMS COMPA N

MOLDING MACHINES · FLASK E

d for

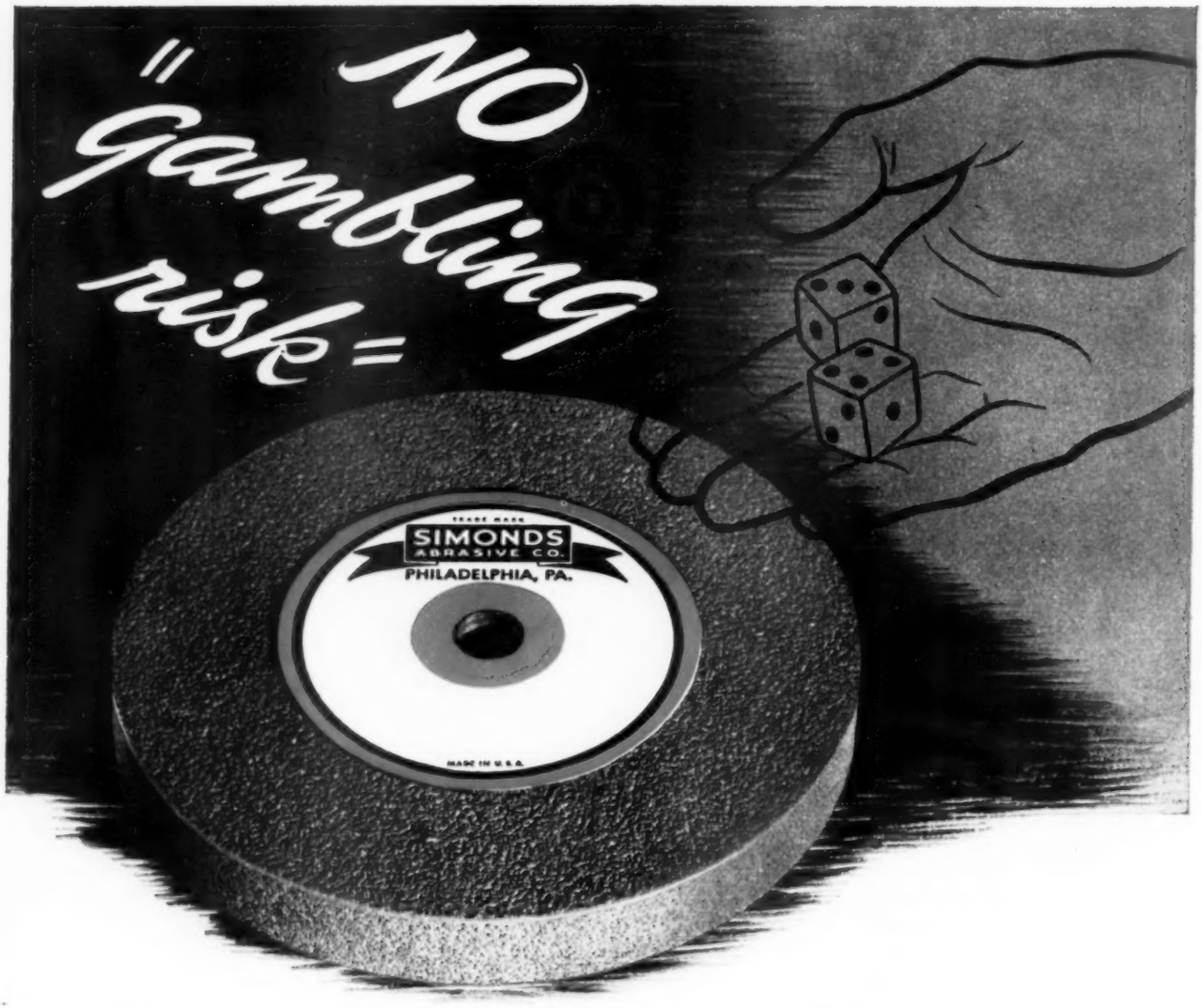
CTION!

Steel Jackets
Aluminum Jackets
Cast Iron Jackets
Steel Bands
Steel Upsets
Cherry Upsets
Aluminum Upsets
Molding Machines
Vibrators
Knee Valves
Table Rappers
Tubular Sprue Cutters

Descriptive literature on any of these items gladly furnished!

NY · DUBUQUE, IOWA · U.S.A.

K EQUIPMENT Established 1883



Efficient means of selection—control in manufacture that leaves nothing to chance—economical, lasting sureness of performance—these are some of the winning qualities that swing the odds solidly in favor of peak production efficiency when you use Simonds Abrasive Wheels. Thousands of combinations of various types and sizes of grain in every required structure and bond make up the complete line of Borolon* (aluminum oxide) and Electrolon* (silicon carbide) products for all your production and tool room needs. For roughing, cutting, snagging or finishing, for effective, long lasting performance on any material from steel to plastics, Simonds Abrasive Wheels are your best bet. Grinding wheels of every size and shape; Segments, Mounted Wheels and Points; Grains, Bricks and Sticks give new economy and long lasting efficiency when used on the jobs for which they are intended.

You will find Simonds Abrasive distributors, located in all principal cities, eager and ready to help you select the particular Borolon and Electrolon product adapted to every specific job.

*** Time-honored Borolon and Electrolon Abrasive products are now distinguished by the name Simonds.**

SIMONDS ABRASIVE CO. *is a Division of*

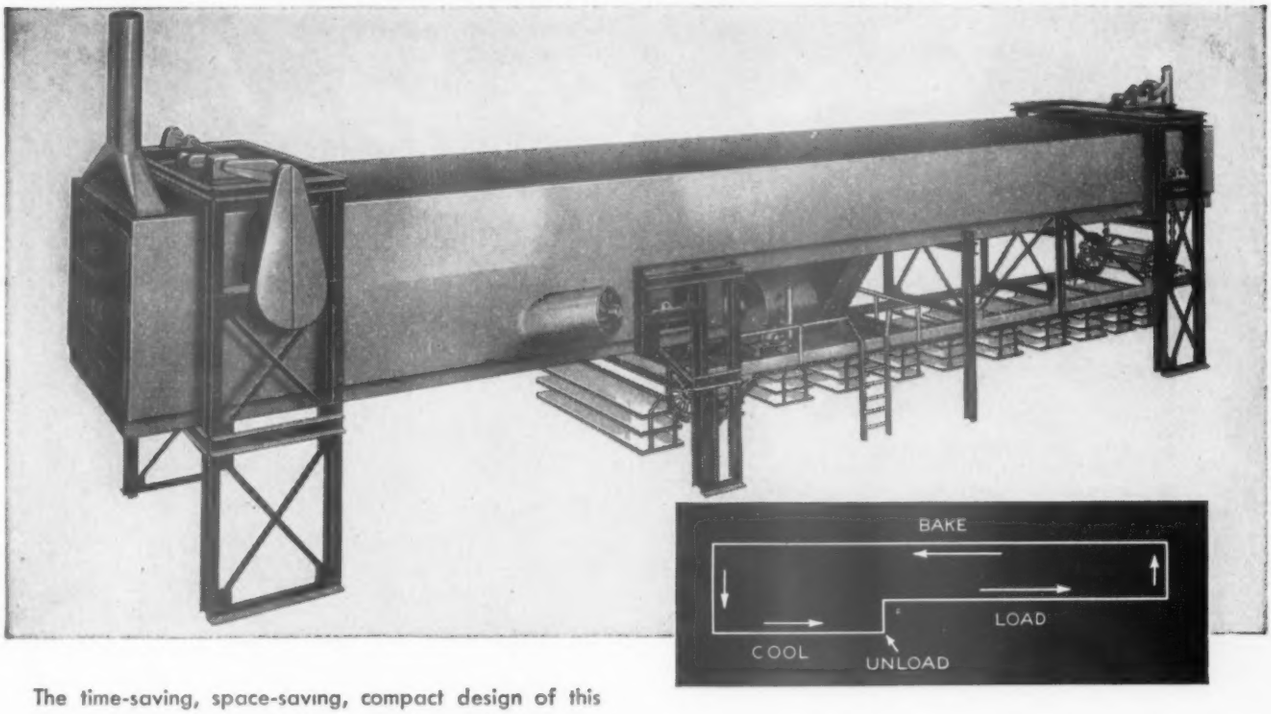
SIMONDS SAW AND STEEL CO.

Other affiliated companies:

SIMONDS CANADA SAW CO. LTD. SIMONDS STEEL MILLS

SIMONDS ABRASIVE CO.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN ALL PRINCIPAL CITIES



The time-saving, space-saving, compact design of this new Horizontal Core Oven is characteristic of Young Brothers' Engineering. Into it went the skill and confidence of many years of experience . . . also a thorough knowledge of the job to be done and the production problems involved.

This new core oven can be installed in practically any building without making any major structural changes.

The coremakers are located right next to the oven so that they can load the cores directly on the moving racks thus eliminating the necessity of transporting them on hand trucks or a conveyor from the core room. The location of the coremakers, at the oven, also saves core room space.

The size of the loading racks can be varied and the shelves can be adjusted to accommodate cores of many sizes and shapes.

Besides allowing for the removal of exhaust gases at the point of greatest concentration, the new oven design provides an effective cooling zone for the cores and assures comfortable working conditions for the coremakers.

This New Horizontal Core Oven is Young Brothers' answer to the demand for better core baking equipment. It is YOUR answer to the need for lower production costs and higher operating efficiency.

New HORIZONTAL CORE OVEN . . . . . offers many cost saving advantages!

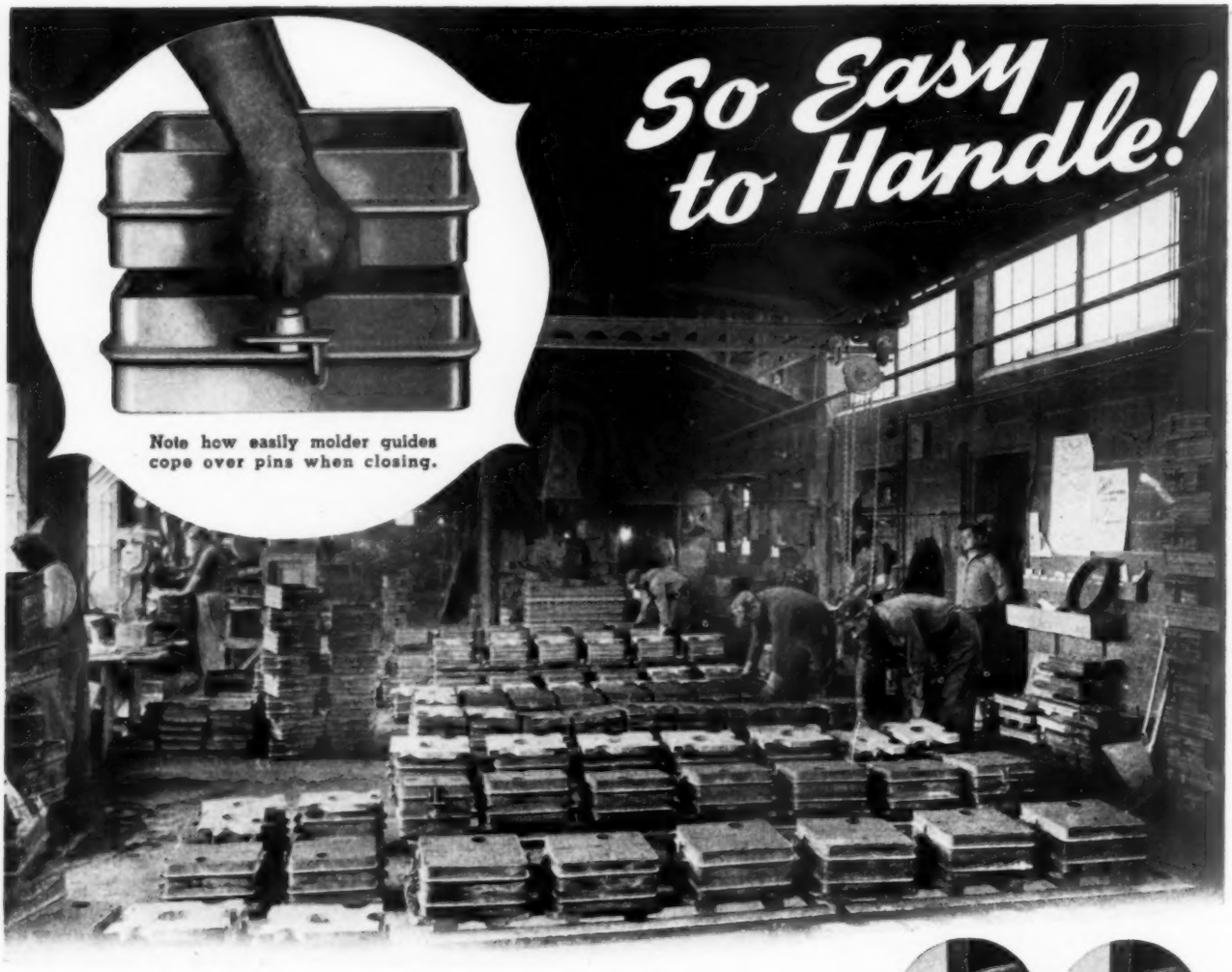
MEMBER

YOUNG BROTHERS COMPANY

6508 MACK AVENUE DETROIT 7, MICHIGAN

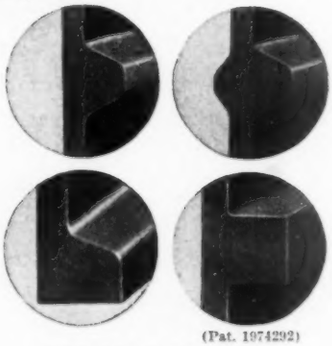
ESTABLISHED IN 1896

So Easy to Handle!



Note how easily molder guides cope over pins when closing.

Sterling Steel Flasks are so easy to handle, they save both time and labor. Pin lugs and handles are combined into a sturdy one-piece combination. The molder can feel the pin with his fingers when closing the flask. If desired, hardened steel bushings can be installed to maintain proper pin clearance. And remember, Sterlings solid, all-welded construction assures a long life of dependable service at low cost. That's why Sterlings are the preferred flasks in more than 4000 foundries.



(Pat. 1974292)

STERLING FEATURES

All welded, integral ribs and flanges; solid center reinforcing rib; square flanges; full-width bearing. Simplifies ramming and shaking out. Speeds up molding.

Sterling FOUNDRY FLASKS

STERLING WHEELBARROW COMPANY • MILWAUKEE 14, WIS., U. S. A.

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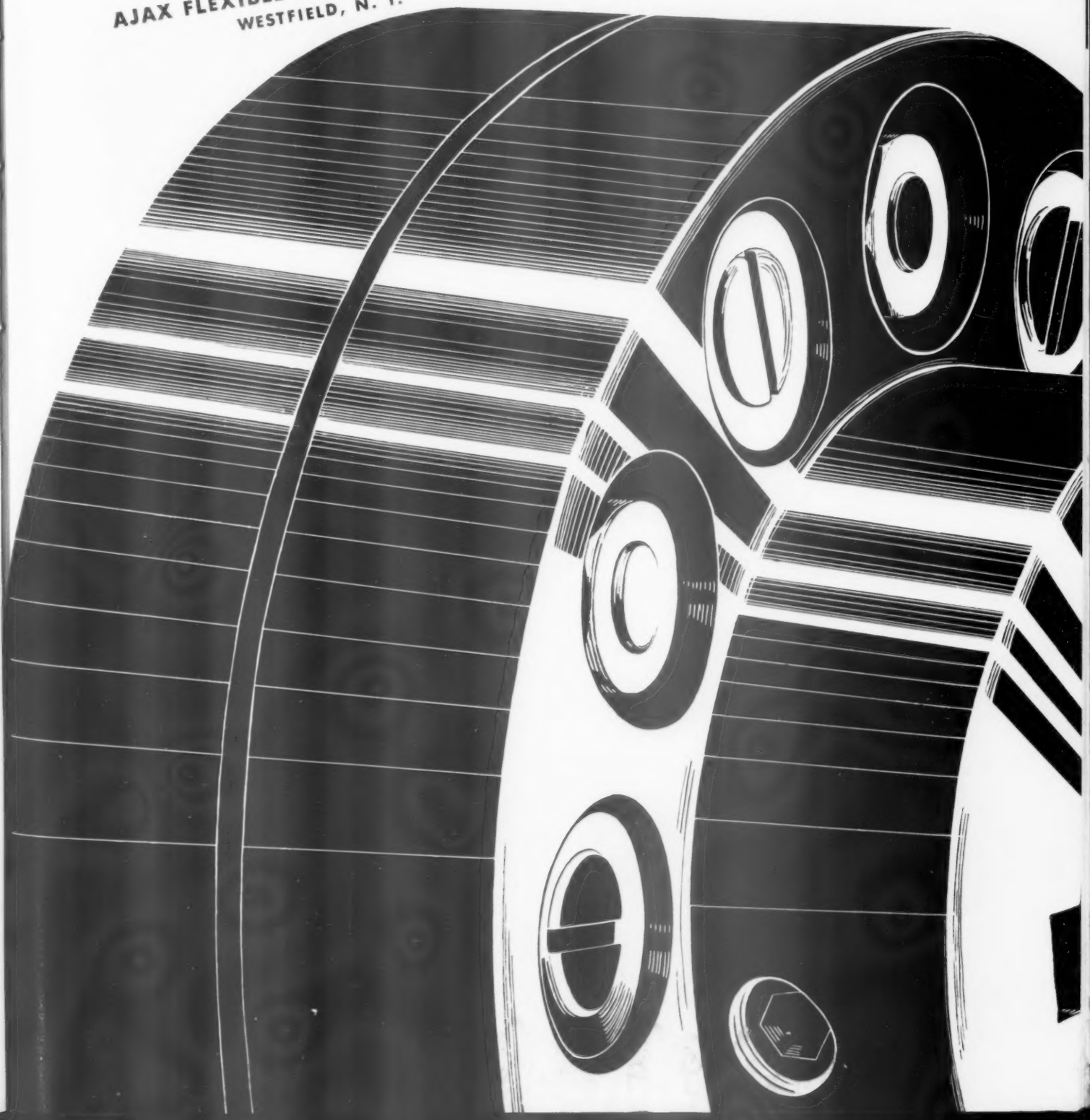
AJAX

FLEXIBLE COUPLINGS

Safeguard your direct-connected machines against unavoidable misalignment with the positive, resilient drive of Ajax Flexible Couplings.

Write for Data Book.

AJAX FLEXIBLE COUPLING CO. INC.
WESTFIELD, N. Y.



Oxygen Consumption...

DIDN'T GROW LIKE TOPSY

. . . because producers of oxygen have maintained continual research and development work in its application, to assure not only efficient and economical use of it in day to day operations, but to further new uses of oxygen for lower cost production of goods.

As a result of this, oxygen is an indispensable servant of all industry and will become increasingly important in the production era of the future.

Today Airco is using all its facilities to accelerate progress in research and development. Its technical staff, which introduced such processes as flame scarfing, flame gouging, flame cutting, flame cleaning, will, in the future, develop new and better applications of existing processes and, in addition, extend the use of oxygen to fields yet unexplored.

Airco looks to the future!

• • • •

An interesting booklet, "Oxygen—Indispensable Servant of Industry", is yours for the asking. Fill in the coupon, or write: Air Reduction, 60 East 42nd St., New York 17, N. Y. In Texas: Magnolia Airco Gas Products Co., Houston 1, Texas.

AIR REDUCTION
60 East 42nd St.
New York 17, N. Y.

Send me your booklet: "Oxygen — Indispensable Servant of Industry".

Firm_____

Signed by_____

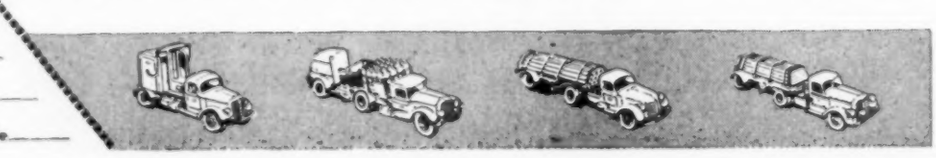
Address_____

City_____ Zone___ State_____

AIRCO **AIR REDUCTION**

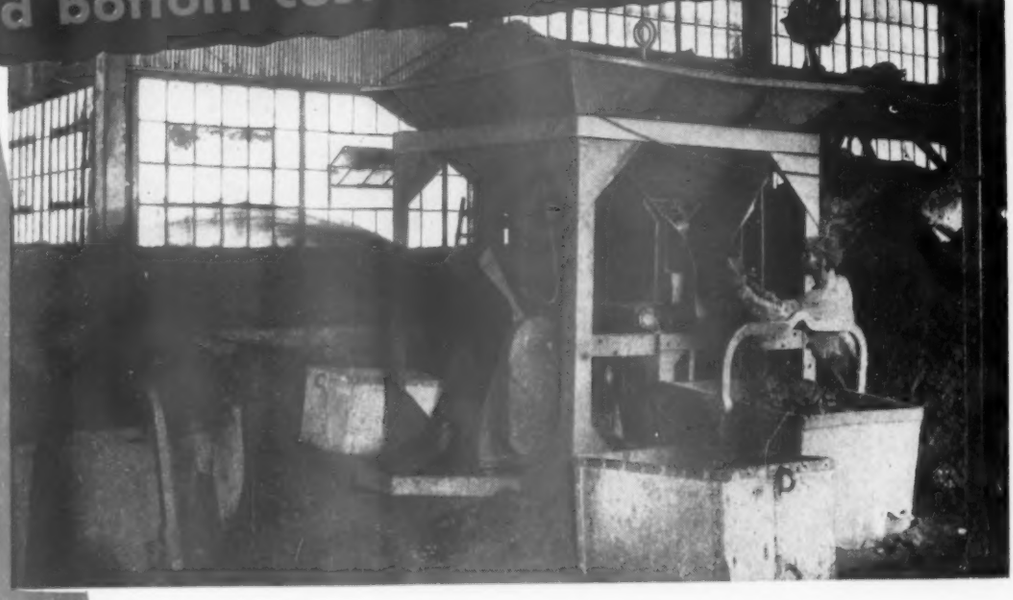
Offices in All Principal Cities

ORIGINATORS OF MODERN OXYACETYLENE METHODS FOR THE METAL WORKING INDUSTRY



THIS UNIT--

Provides complete scrap removal and bottom cost sand conditioning



Royer Model NDC Combination Scrap Remover and Sand Conditioner: 20 to 30 tons of sand per hour capacity—pictured is one of many Royers used in the various foundries of American Manganese Steel Division.

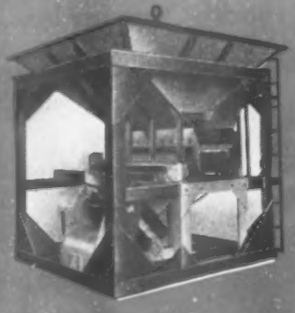
ROYER COMBINATION SCRAP REMOVER AND SAND CONDITIONER

This portable unit offers medium and large sized jobbing foundries the most positive means of substantially reducing sand conditioning costs. With materials and labor at high levels, today's greatest opportunity for effecting worth-while economies is literally "in the sand."

The Royer Combination removes scrap and conditions heap, backing or facing sand in a single rapid operation; reducing costs of the combined tasks up to 51% or more.

Used sand is loaded into the hopper, by a grab bucket or other means, and fed into a Royer Scrap Remover. Here scrap, burned cores, gaggers and other sand contamination are efficiently removed and discharged. The sand is then automatically fed into a Royer Sand preparing unit, where it is given the thorough Royer 6-point conditioning—final refuse removal, positive lump breaking, blending and mixing, even moisture distribution, increased permeability and double aeration. Open, velvety, correctly conditioned sand is discharged in ideal condition for molding.

The Royer Combination can be readily moved by crane from bay to bay, and requires no pits or special foundations. A heavy center eye bolt facilitates handling.



Royer Model RC Combination Scrap Remover and Sand Conditioner: capacity 40 to 50 tons of correctly prepared sand per hour.

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

KINGSTON, PENNSYLVANIA

For today as well as tomorrow...

HY-TEN DRY CORE BINDERS

...based on thermo-setting resins

TOMORROW . . .

Dielectric core baking cures cores in minutes instead of hours. This new process was demonstrated by us in conjunction with the Induction Heating Corp. at the Foundry Show last May.

Hundreds of foundries sent their top men to Cleveland to learn about this procedure, which depends on thermo-setting resin-type binders that bake through almost instantaneously when moisture is driven off.

Hy-Ten *Dry* Core Binders thereby hold great promise as the foundry core binders of tomorrow—available for use today.

TODAY . . .

You need not wait to install dielectric core baking equipment to speed up baking time. Hy-Ten Dry Core Binders are already being used in leading foundries because they cut baking time in half . . . because cores made from them collapse readily, gas far less.

For those foundries requiring core oils Houghton supplies mineral polymer oils based on the "polythermic" principle. Ask about the Hy-Ten 10-70 Series.

Leaflets describing these Houghton products for today's foundry needs will be mailed on request. Available also is the Houghton Personalized Foundry Service, rendered by men who know foundry core-rooms and their problems. So, for today and tomorrow, rely on—

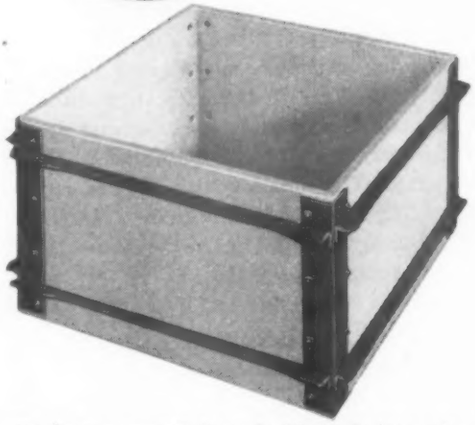
E. F. HOUGHTON & CO.

303 W. Lehigh Ave., Philadelphia

Service and Sales in all principal cities

NON-BURN SLIP JACKETS

Are Not Affected by Run-outs and Spill-overs



On jackets over 8" deep, double angle iron reinforcements are used as illustrated.

On jackets up to 8" deep, a single angle iron is used.

Now you can put an end to expensive, time-consuming troubles due to unsatisfactory slip jackets. Use CMD NON-BURN, NON-WARP jackets! They are specially designed to withstand run-outs and spill-overs without damage. These non-sticking jackets will strip perfectly clean and last far longer than ordinary types.

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FOR MORE INFORMATION WRITE FOR CIRCULAR!

CHICAGO MANUFACTURING AND DISTRIBUTING CO.

1928 WEST 46th STREET CHICAGO 9, ILLINOIS

CLECO GRINDERS

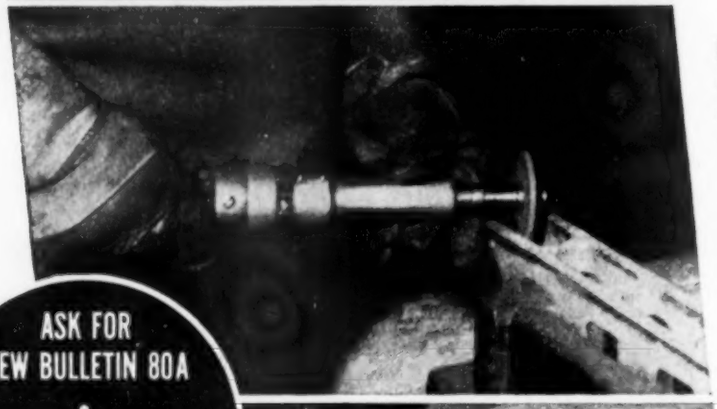
. . . the RIGHT model for EVERY job

HEAVY DUTY GRINDERS. Packed with power, yet easily held and vibration free. These tools start immediately even under load. The governor is set so that at 80-lb. pressure it holds the grinder safely at its most effective speed. Tool automatically shuts off if governor should break. Speeds from 3,000 to 9,000 R.P.M., straight or spade handles.

★

CONE GRINDERS. For grinding fillets and other curved surfaces of small radii. Also widely used to reach hard-to-get-at interior areas of dies, molds and castings. Ideal for auto body work and similar metal finishing. These tools are adaptations of our 490 and 460 Series (speeds of 5,800 to 9,000 R.P.M.) and our 214 Light Grinder Series (14,000 to 18,000 R.P.M.).

★



LIGHT GRINDERS. These small yet rugged pneumatic tools are splendid for finishing forgings, dies, metal patterns, castings and similar types of work. The 214 Series, governor controlled and including exhaust deflectors, operates at 14,000 to 18,000 R.P.M. The smaller No. 9 Series runs at 20,000 R.P.M. Weighing 1½ lbs. or less, this latter series uses ¾" mounted wheels.

★

VERTICAL GRINDERS. Used with abrasive wheels for surfacing steel sheets and bars, cleaning up welding operations, etc.; fitted with pad and abrasive discs they are used for auto body work, on metal furniture, etc.; also these vertical grinders can be fitted with cup wire brushes for removing rust, scale, paint, etc., from metal. Speeds from 4,300 to 8,000 R.P.M.

ASK FOR NEW BULLETIN 80A

•

Replete with illustrations, it contains full data on over 35 sizes and types of Cleco Grinders, plus facts on air line accessories.

THE CLEVELAND PNEUMATIC TOOL CO. • 3781 EAST 77TH STREET CLEVELAND 5, OHIO

BRANCH OFFICES IN ALL PRINCIPAL CITIES

Over 1,625 Flasks EVERY HOUR!

The installation above, consists of two 3' x 8', Model "B" Simplicity Shake-Outs. It is probably the most automatic, high speed shake-out in operation in the world today! The upper unit is equipped with a horse, or bolster over which all the flasks must pass while suspended by the arm clamps on the conveyor overhead. This upper unit shakes out over 1625 flasks per hour, while the lower unit knocks out 95% of the core sand from all fittings or castings. Over 1200 units are giving maximum service daily in over 550 foundries and handle a variety of work from a great number of flasks per hour, to 95 ton loads which are shaken out in two to three minutes. Speedier shake-out with maximum flask savings and the reduction of manpower required amortize the equipment cost in less than a year. Every Simplicity unit can be used portably until permanent installation is desirable. Have a Simplicity Engineer check your requirements.

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY
DURAND, MICHIGAN

● *The type of machines used, the kind of dust produced, the plant layout . . . all are important considerations in planning an efficient, correctly engineered dust control system.*

DUST CONTROL *Engineered* to "FIT THE JOB"

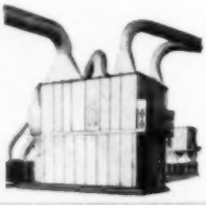
● The mechanical installation of dust control equipment is one thing. *Engineering* a system to meet the specific requirements of a particular plant is quite another.

Each Kirk & Blum dust control system is *fully and correctly engineered* to "fit the job". First, our engineers make a thorough analysis of your special dust control problem. Next, our staff selects the *right* collection units—wet, dry or centrifugal—from among the various makes available. Finally, they design and install a complete system guaranteed to give maximum results at minimum cost.

For an entire new dust control installation, or an expansion or modernization of present equipment, it will pay you to rely on the impartial scientific counsel of K & B "Air Engineers". For details, write now to: THE KIRK & BLUM MFG. CO., 2808 Spring Grove Ave., Cincinnati 25, Ohio.

Rotoclone for wet process air cleaning, foundry shakeouts, etc.

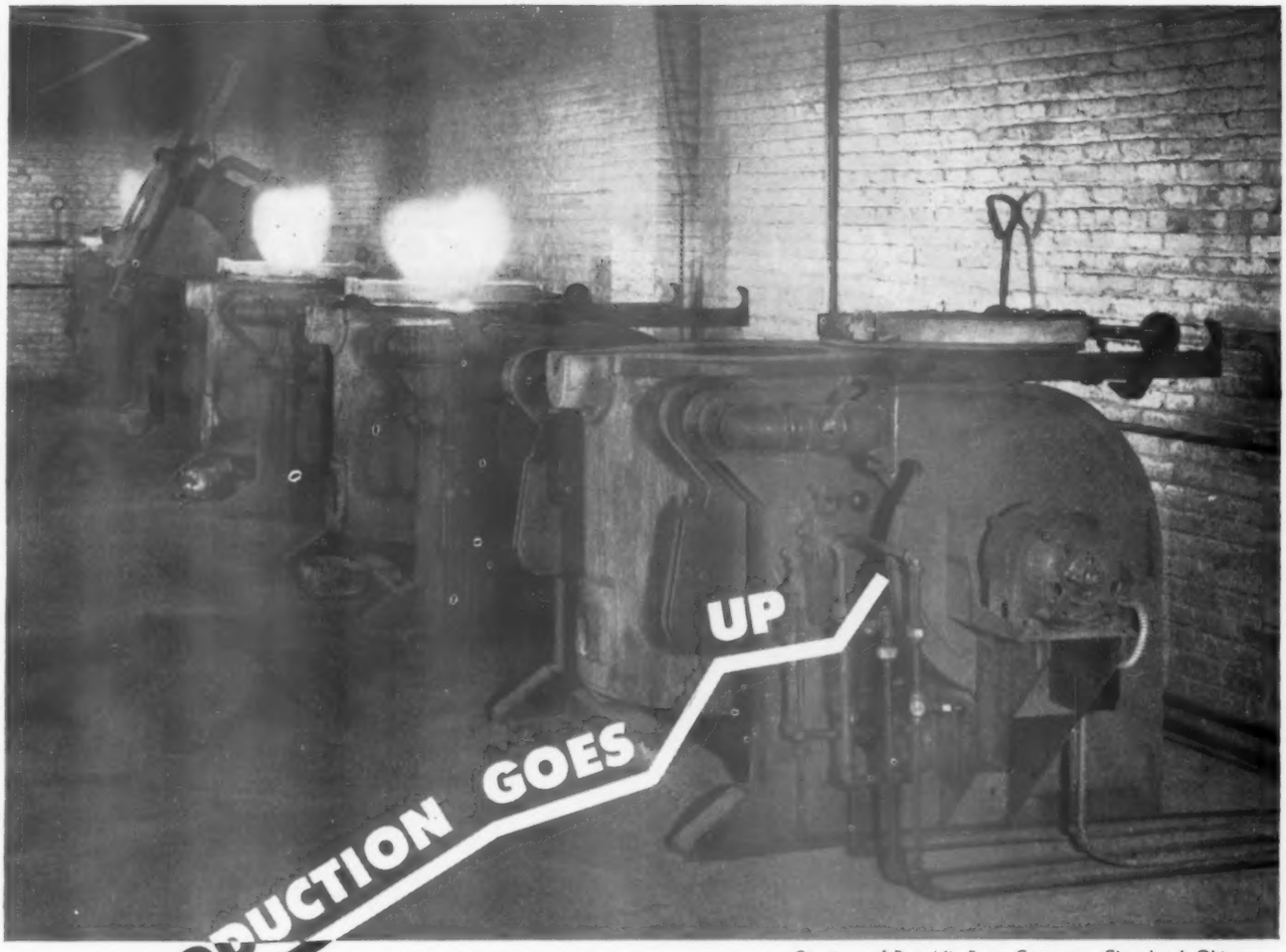
Centrifugal Separator suitable for heavy dust concentration.



Cloth screen filter used where clean, dry, returnable air is required.

KIRK AND BLUM

SPECIALISTS IN ENGINEERED DUST AND FUME CONTROL



Courtesy of Republic Brass Company, Cleveland, Ohio

WHEN YOU INSTALL "FISHERS"

Because:

1. Shut-down time, for repairs, is greatly reduced by the "sealed-in" burners used in "Fishers", which prevent excess air from eating away red hot refractories and crucibles.
2. Better metal is produced and refractory life increased in "Fishers"—by assurance of correct melting time.
3. Only *foundry-proven* features are incorporated in "Fishers"—Fisher has long led the field in furnace development.
4. Proper control of furnace atmosphere is a feature in "Fishers"—insured by the employment of the *time-proven* principle of multiple burners with appropriate mixing equipment.
5. Since 1906—highest quality of metal, extreme fuel economy and noteworthy labor savings have been characteristics of all "Fishers."

Fisher has published a well illustrated and fully descriptive Bulletin on every piece of Fisher equipment offering a wide selection of all types and capacities of non-ferrous metal melting furnaces, blowers and accessories—ask for your copies.

5519 N. Wolcott Avenue, Chicago 40, Illinois

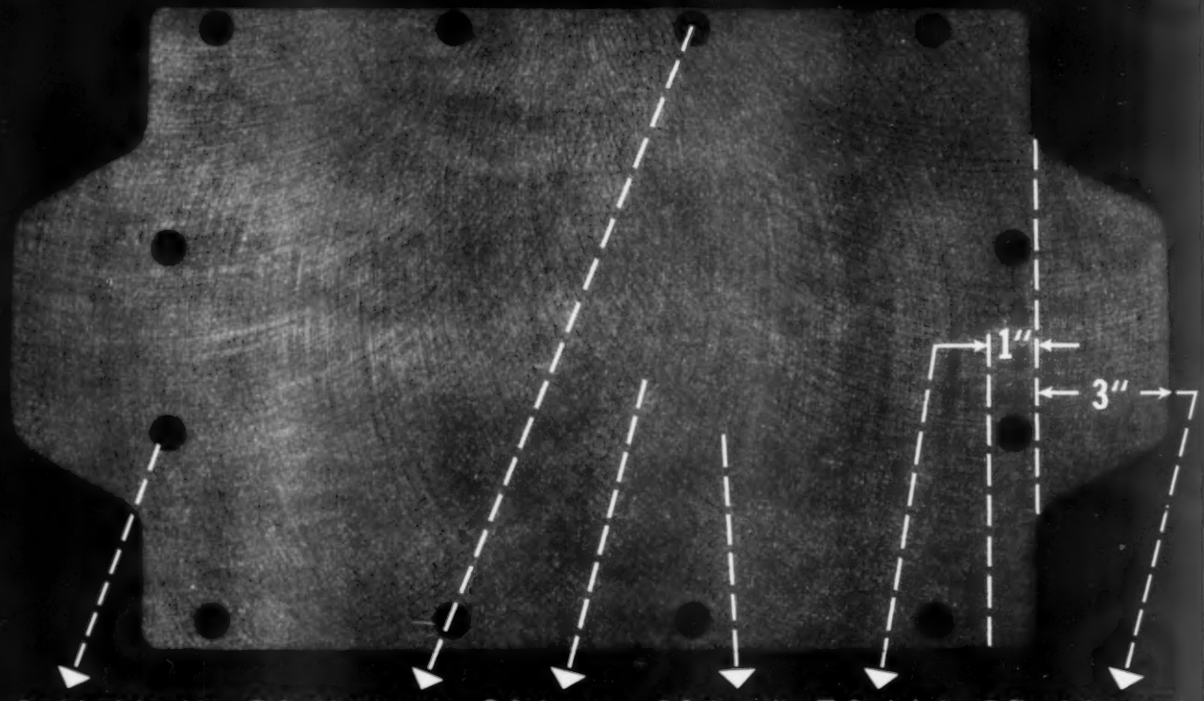
Fisher FURNACE COMPANY

Engineers and Manufacturers

Here's our latest baby-

THE NEW KINDT-COLLINS MASTER CAST AND GROUND FLAT ALUMINUM TUFF-PLATE

PATENT PENDING



1 Tough knurled steel inserts cast integrally into the plate—reduce wear by flask to a minimum—greatly increase plate life.

2 Steel inserts are so placed as to effectively distribute and equalize wear at flask contact point.

3 Surface specially ground to prevent sand slippage.

4 Entire unit accurately ground to plus or minus .003".

5 One-inch allowance all around for flask strip.

6 Three-inch ears standard—to accommodate all types of flask-pin guides. Edges rounded for easy handling.

Again Kindt-Collins offers an innovation in the foundry field . . . *the first big improvement in pattern plates in 20 years* . . . the new MASTER Ground Aluminum Flat Plate with cast-in tough steel inserts!

Study each special feature of this advanced new plate as described above. All these were developed by The Kindt-Collins Company to help you get high production without plate replacement and delays. MASTER Tuff-Plates will deliver longer life and economy in patterns, and assure increased accuracy in your castings.

For maximum volume output insist on having your production patterns mounted on MASTER Tuff-Plates—and note the savings.

Order a supply of MASTER Tuff-Plates today—prices on request.

MASTER Tuff-Plates are immediately available in the following flask sizes, in one-inch gradations:

10" x 12" thru 10" x 20"
11" x 12" thru 11" x 20"
12" x 12" thru 12" x 20"
13" x 14" thru 13" x 20"
14" x 14" thru 14" x 20"

in thickness of
3/8", 7/16", 1/2"

At present sizes other than those listed must be considered special and will be made to order. Other standard sizes will be added later . . . Write your requirements

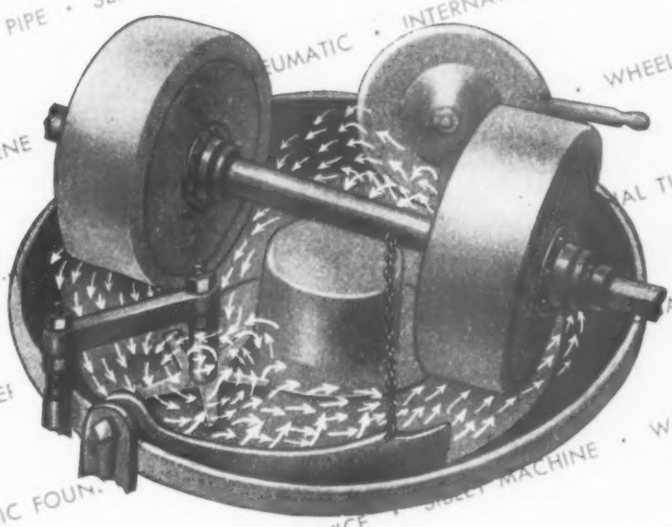
KINDT-COLLINS MASTER PRODUCTS

THE KINDT-COLLINS COMPANY

"EVERYTHING FOR THE PATTERN SHOP"

12653 ELMWOOD AVENUE ★ CLEVELAND 11, OHIO

A GOOD NAME IN SAND PREPARATION—



CLEARFIELD

Back of the Clearfield Mixer are satisfied users in foundries of every size and type.

CLEARFIELD MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U. S. A.

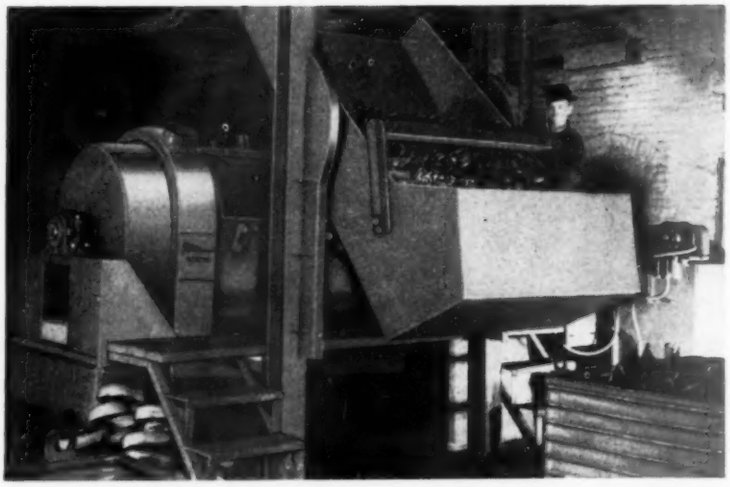
RANSOHOFF WET CLEANING MILLS

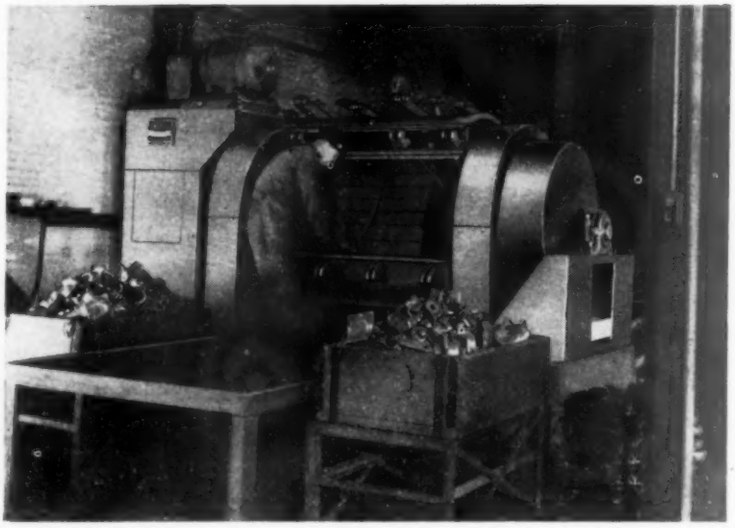
AUTOMATIC STAR-RETURN

Weigh these reasons . . .

THEY SHOW THE WAY TO SAVINGS IN YOUR OWN PLANT

1. *SAVE ON* **LABOR COSTS**
2. *SAVE ON* **MAINTENANCE COSTS**
3. *SAVE ON* **FLOOR SPACE**
4. *IMPROVE* **WORKING CONDITIONS**





RANSOHOFF features are in the 1946 manner . . . radically different from "horse and buggy days". Materials, engineering, construction . . . everything is right up to the minute.

In addition, the basic principle in cleaning is RIGHT. Note: in the RANSOHOFF WET METHOD castings are buried in a mass of stars intermingled without voids. Stars enter and return automatically. No breaking, nicking or mill wear. Mills are not self-destructive. No dust collecting systems needed.

Automatic handling of stars . . . easy . . . gentle . . . economical . . . not self-destructive.

MEMBER

MANUFACTURERS ASSOCIATION, INC. FOUNDRY EQUIPMENT

• • • •

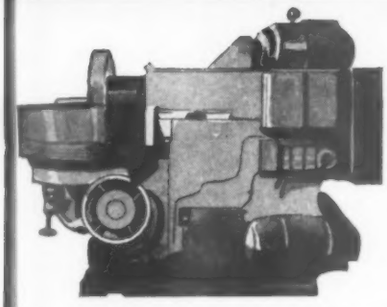
SEND US A SAMPLE BATCH for complete report on how to save on your cleaning costs. No charge or obligation.

N. Ransohoff, Inc.

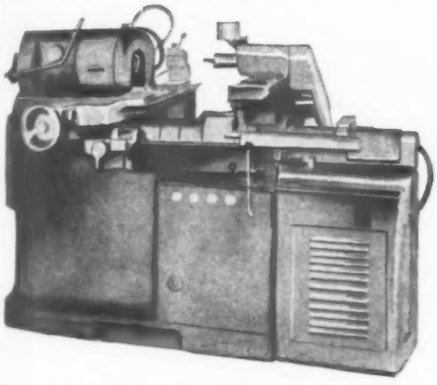
Township Rd. & Big 4 RR CINCINNATI 16, OHIO

External Cylindrical, Plain. 1730 of these machines with swings from under 6" to 20" are warehoused in the Boston, Chicago, Cleveland, Detroit, Philadelphia, St. Louis and New York areas.

15,996 GRINDERS



M. Horizontal Spindle Surface Grinder. Here is a modern rotary table type machine which can be obtained in Chicago, Cleveland, Detroit and St. Louis in sizes ranging from 12" to 30" table diameters.



H. Internal Cylindrical, Hydraulic Feed. These modern production machines are available in quantity in Cleveland and Detroit and in smaller amounts in other W.A.A. offices. These are precision tools with many applications to post-war production needs.

GOVERNMENT-OWNED SURPLUS PRODUCTION EQUIPMENT

Take your pick of these modern, high-speed tools left over from war. Here by the hundreds are the grinders you need to complete reconversion or finish tooling up for new post-war products. These machines are ready to go to work for you at once. To secure specifications, price and shipping information, simply check the coupon below. Or, if you wish to see the equipment call your nearest W. A. A. office to help you make the necessary arrangements.

SPECIAL GRINDER BUYS!

KEY	TYPE	SIZE OR CAPACITY	QUANTITY AVAILABLE NOW
A	External Cylindrical—Plain	Up to 20" swing	1730
B	External Cylindrical—Universal	Up to 16" swing	347
C	Centerless—Internal and External	All sizes	607
D	Cam		223
E	Crank Pin		83
F	Valve		245
G	Internal Cylindrical—Mech. Feed	All sizes	320
H	Internal Cylindrical—Hydraulic Feed	Up to 42" swing	1094
I	Internal Cylindrical	Under 12" swing	151
J	Internal Cylindrical—Auto Siz. Comb. Hole & Face	16" swing and over	127
K	Internal Cylindrical—Auto Siz. Planetary Type	Under 16" Diam.	39
L	Internal Cylindrical—Auto Siz. Centerless	Up to 28" Diam.	146
M	Surface—Horiz. Spindle Rotary Table	All size table diam.	274
N	Surface—Vertical Single Spindle Rotary Table	12" to 48" Table diam.	157
O	Surface—Reciprocating Horiz. Spindle—Hand Feed	12" length work cap. and over	146
P	Surface—Reciprocating Horiz. Spindle—Power Feed	Under 18" to 120" length work cap.	840
Q	Thread—External only	All sizes	635
R	Thread—External & Internal	3" Cap. and over	82
S	Tool & Cutters	All sizes	691
T	Drill	All sizes	348
U	Single Point Tool	All sizes	458
V	Bench—Double End	All sizes	2076
W	Bench—Single End	Up to 8" Wheel Diam.	1105
X	Floor—Double End—Dry	Up to 24" Wheel Diam.	831
Y	Floor Comb.—Wet & Dry	10" to 16" Wheel Diam.	216
Z	Snag—Swing Frame		155
AA	Comb. Grinder & Buffer		1805
BB	Race Radius—External		118
CC	Race Radius—Internal		72
DD	Contour Profile		75

CHECK AND MAIL TODAY!

To War Assets Administration:*

Without obligation, please send me detailed specifications and price data on the following checked items:

A	G	M	S	Y
B	H	N	T	Z
C	I	O	U	AA
D	J	P	V	BB
E	K	Q	W	CC
F	L	R	X	DD

Grinder check list

Key letters correspond to items shown in list at right. Simply check the key letter of the items in which you are interested.

Name.....Telephone No.....

Firm.....

Address.....

City.....State.....

*For W.A.A. address see 4th page of this advertisement. 27-5

All items shown on these pages are offered subject to prior sale. This surplus property has previously been advertised and offered to prior claimants including Veterans of World War II.

GET

EXPEDITING COUPON Free Information, Check and Mail Today

To War Assets Administration*: Please send me specifications, prices and other pertinent information on the items listed below:

(To save writing simply use the key numbers shown in the left hand column of the list at right.)

.....

.....

.....

Name .....Telephone No. .....

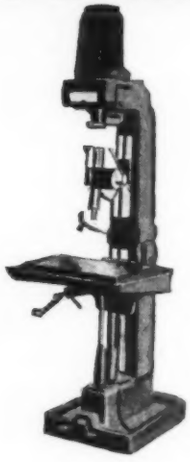
Firm .....

Address .....State .....

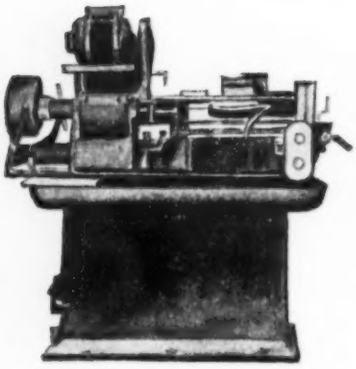
City .....

277-5

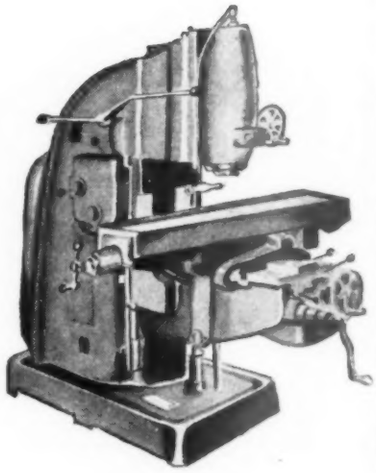
*For W.A.A. addresses see 4th page of this advertisement



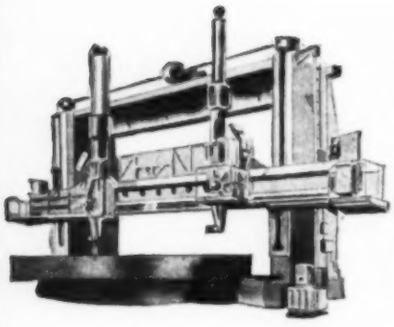
6. and 7. Box Column, Single Spindle Drill. 474 machines of this type with capacity up to 1" and swings up to 24" are in warehouses in Cleveland, Chicago, Detroit, New York, Philadelphia and St. Louis.



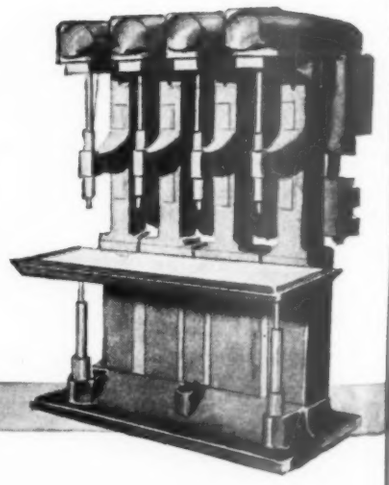
25. Automatic Screw Machine-Bar. This single spindle, indexing turret tool is typical of the 1975 such tools available now in Detroit, Cleveland, Nashville, and Philadelphia.



29. Vertical Universal Miller. In Boston, Chicago, Cleveland, Detroit and New York areas there are 847 of these machines in all sizes and types ready for immediate application.



2. Vertical Boring and Turning Mill. These huge, heavy duty machines may be obtained in sizes from 36" to 120". They are available in all sizes in Detroit and in most sizes in several other W. A. A. offices such as Chicago, Cleveland and Philadelphic.



15. Sensitive Floor & Pedestal Drills — Box Column. There are 3142 of these drills ½" capacity and over, 12" swing and over, located in Detroit, Boston, San Antonio, Denver, St. Louis, Spokane, Cleveland, Chicago and New York.

Veterans of World War II—To help you in purchasing surplus property, Veterans' units have been established in each War Assets Administration Regional Office.

THEM NOW!

GOVERNMENT-OWNED SURPLUS MACHINE TOOLS

No need to wait for modern production equipment! The tools that won the war can win extra profits for you . . . and do it now! Just look at the hundreds of machine tools shown in this advertisement—all ready for immediate shipment anywhere. For detailed specifications, prices, shipping procedures and location of the equipment simply fill in and mail the coupon at left to your nearest W. A. A. office. Or, if you prefer, call and make arrangements to visit the plants and warehouses where the equipment in which you are interested is stored.

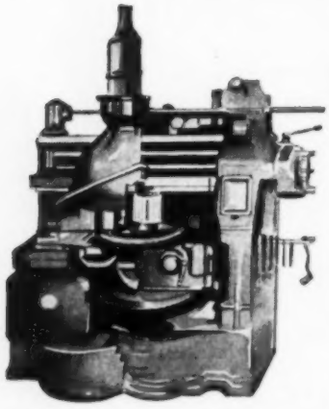
CHECK LIST OF SPECIAL MACHINE TOOL BUYS!

Here are a few of the many hundreds of machine tools available through War Assets Administration.

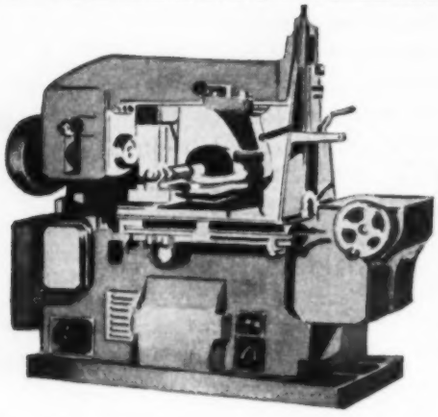
KEY	MACHINE	TYPE	SIZE OR CAPACITY	QUANTITY AVAILABLE NOW
1	Boring, Drilling & Milling	Horizontal	Under 3" to 6"	209
2	Boring & Turning Mills	Vertical	Under 36" to 120" Swing	693
3	Boring & Turning Fixed Rail Mills	Vertical		87
4	Precision Boring Machines	Horiz. bridge—single end	Under 8" to 14"	486
5		Horiz. bridge—double end	Under 8" to 14"	226
6	Drills	Box column—single spindle	Under ½" Cap. Up to 22" Swing	287
7			½" to 1" Cap. 16" to 24" Swing	187
8		Round column—single spindle	Under ½" Cap. Up to 22" Swing	733
9			½" to 1" Cap. 16" to 24" Swing	1163
10		Sensitive Floor & Pedestal Box col.	Under ½" Cap. 12" to 22" Swing	933
11			½" to 1" Cap. 16" to Over 24" Swing	1675
12			1" Cap. and over 24" Swing & over	434
13		Sensitive Floor & Pedestal Round col.	Under ½" Cap. 12" to 22" Swing	384
14			½" to 1" Cap. Under 16" to 24" Swing	1131
15	Drills	Sensitive Floor & Pedestal Upright Type—Box Col.	Up to 20" Swing	549
16		Sensitive Floor & Pedestal Upright Type—Round Col.	Up to 28" Swing	151
17		Heavy Mfg. Type	Up to 32" Swing	296
18		Spec. Kingsbury Way & Vertical		230
19	Multi-Tool	Heavy Duty Mfg. & Production (Not automatic)	Up to 20" Swing	728
20	Lathe	Single Spindle—Horiz. Platten Type		63
21		Single Spindle—Horiz. Turret Type		280
22		Multi Spindle—Horiz. (4-5-6 & 8 spindle)		1518
23		Multi Spindle—Vertical (6 and 8 spindle)		202
24	Chucking Machine	Auto. Between Centers Horiz. Single Spindle	All sizes	2036
25	Screw Machine	Auto—Bar—Single Spindle	Up to 1⅓" Cap.	1975
		Auto—Bar—5 Spindles	All sizes	1515
26	Screw Machine	Auto—Bar—Eight Spindle,	1½" and Over Cap.	380

KEY	MACHINE	TYPE	SIZE OR CAPACITY	QUANTITY AVAILABLE NOW
27	Miller	Horiz.—Plain—Hand Feed	10" and Over Table travel	564
28		Horiz.—Plain—Knee Type	All sizes	2125
29		Vertical—Universal	All sizes	847
30		Automatic	All sizes	455
31		Bed Type—Plain—Horiz. Spindle	All sizes	2703
32		Vertical Spindle—Std.	All sizes	428
33		Vertical Fixed Bed Profiler (1 & 2 Spindle)		847
34		Thread—Universal—Not Automatic	12" and over Work Diam.	76
35		Thread—Universal—Auto.	Up to 20" Cap.	238
36		Thread—Auto.—Chucking		207
37		Planetary	6" to Over 10" Work Diam.	206
38		Spline		248
39	Engravers	Pantagraph—2 Dimensions		70
40	Honers	Internal—Horizontal	Under 6" Bore	175
41		Internal—Vertical		129
42	Lapping	Flatsurface only	24" Diam. Lap Plate	107
43	Polishers & Buffers	Floor Type	½ to 10 H.P.	1479
44	Lathes	Speed Type	Up to 3 H.P.	1490
45	Saws	Circular Cut-Off		250
46	Lathes	Cut-Off	Under 1" Bore	136
47	Abrasive Machine	Belt Drum & Disc		580
48	Abrasive Cut-Off			112
49	Tapping	Vertical—1 & 2 Spindle		457
50		Horizontal—1 Spindle		259
51	Die Threading	Belt Rotary—1 Spindle		390
52	Centering	Double End—Horizontal		112
53	Pointing, Chamfering & Burring			141
54	Shaver	(Not Gear)		104
55	Reamer	(Not Rifle)		516
56	Drawing Machine		100,000# and over	21
57	Machinery & Equipment Allied to Primary Metal Forming Mach. & Equip.	Pickling	All sizes	149
58	Straight Side Presses	Vertical—Single action	5 to 100 Tons	165
59		Vertical—Double action	5 to 100 Tons	111
60	Flame Cutting Machine			1631
61	Hardness Tester	Brinell—Portable & Power		200
62		Rockwell—Manual & Power		425
63	Inspection Machine	Magnetic (Magnaflux)		601
64	Balancing Machine	Static		93
65		Dynamic		67

GEAR CUTTING and FINISHING TOOLS



C. Gear Shaper, External and Internal. Two hundred and eighty of these modern machines are available for immediate delivery in Boston, Chicago, Detroit and New York. Sizes above 25" are to be found in Detroit only.



A. Gear Hobber, Horizontal. These machines, available in Chicago, Houston, Detroit and New York, may be obtained in sizes up to 16" capacity for spur and helical gears and pinions and straight splines.

GOVERNMENT-OWNED SURPLUS PRODUCTION EQUIPMENT

All over America urgently needed production is being held up and profits lost for lack of essential parts—many of them gears. In the W. A. A. warehouses, are 2353 highly productive gear cutting and finishing machines of standard make—ready to go to work immediately to produce needed parts. To see them you need only to contact your nearest W. A. A. Regional Office below—or watch your newspapers for special sale announcements in your locality.

SPECIAL BUYS!

KEY	MACHINE	TYPE	SIZE OR CAPACITY	QUANTITY AVAILABLE NOW
A	Gear Hobber	Horizontal	4" to 16" Cap.	321
B		Vertical—Universal	Under 16" Diam.	89
C	Gear Shapers	External & Internal	Up to 40" Diam.	280
D		Spur—External only		152
E		Spur & Helical—Ext. & Int.	Up to 25" Diam.	275
F		Spur & Helical—Ext. only		159
G		Bevel Type not incl. Plainer Type Str. Bevel	Up to 36" Diam.	377
H	Gear Tooth Finisher	Generating Type Grinding		140
I		Formed Wheel Type		190
J	Gear Tooth Lapper	External only		80
K		Comb. External & Internal		57
L	Gear Tooth Shaver	Rotary Type		133

FREE INFORMATION:

To War Assets Administration:

Please send me specifications and price information on the items checked below:

A	E	I
B	F	J
C	G	K
D	H	L

Key Check List: These Key letters correspond to the items listed in the table at the left. Simply check the key letter for the data you want.

Name.....Telephone No.....

Firm.....

Address.....

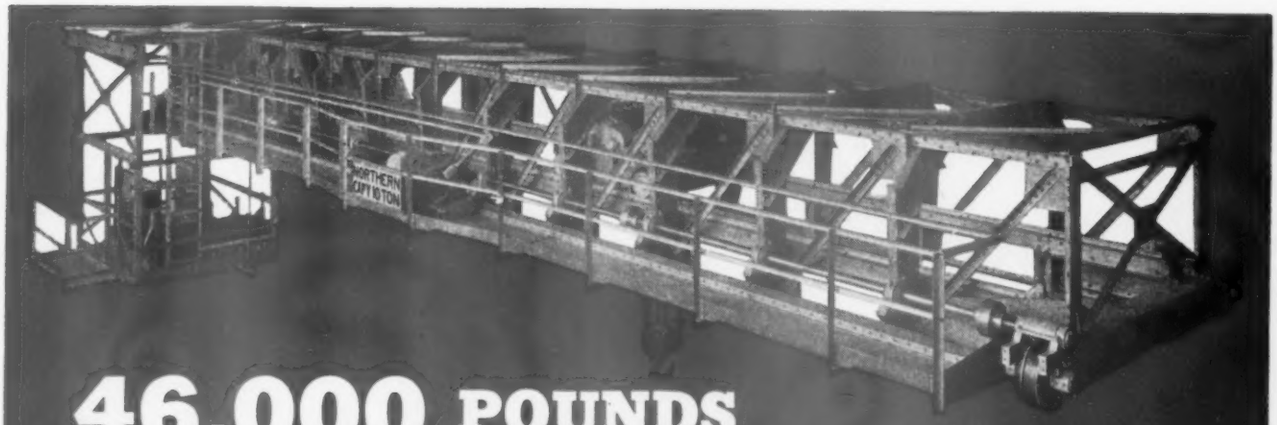
City.....State.....

277-5

WAR ASSETS ADMINISTRATION

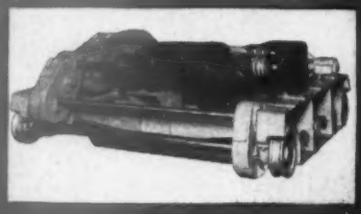
OFFICES LISTED BELOW ARE TEMPORARILY IN RECONSTRUCTION FINANCE CORPORATION AGENCIES

Offices located at: Atlanta · Birmingham · Boston · Charlotte · Chicago · Cleveland · Dallas · Denver · Detroit · Helena · Houston · Jacksonville Kansas City, Mo. · Little Rock · Los Angeles · Louisville · Minneapolis · Nashville · New Orleans · New York · Oklahoma City Omaha · Philadelphia · Portland, Ore. · Richmond · St. Louis · Salt Lake City · San Antonio · San Francisco · Seattle · Spokane · Cincinnati Fort Worth (Telephone 3-5381)



46,000 POUNDS WEIGHT SAVED

ALUMINUM CRANE built by NORTHERN ... In Satisfactory Operation over 15 Years



Illustrated here is a crane of 10 ton capacity, 76' - 6" span, built almost entirely of aluminum alloy castings and rolled aluminum structural sections. The total weight including the trolley is only 30,000 pounds. The same crane, constructed of steel, weighs 76,000 pounds.

Six of these cranes have been in continuous service since 1929, and have proved satisfactory in every detail. The light weight has substantially reduced the cost of power. Operation is speeded and usefulness increased by the faster acceleration and deceleration.

Light weight reduces wear on operating parts, and materially reduces the load on the building itself.

Use of aluminum in construction of these cranes is a unique application of light metals in the material handling field.

2074

NORTHERN ENGINEERING WORKS

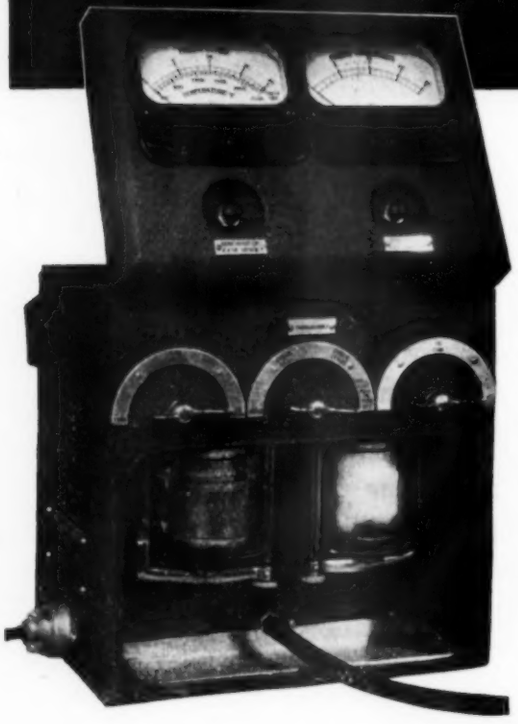
General Offices: 2625 ATWATER ST.
DETROIT 7, MICH.

HEAVY DUTY CRANES • LOW HEADROOM CRANES
BUCKET CRANES • TRANSFER CRANES • ELECTRIC
HOIST CRANES • HAND CRANES • ELECTRIC HOISTS
AIR HOISTS • SPECIAL CRANES AND HOISTS

How efficiently are you Burning Fuel?

YOU CAN FIND OUT – IN JUST A FEW MINUTES – WITH THE CITIES SERVICE

INDUSTRIAL HEAT PROVER



APPLIED to the flue or exhaust of any type of combustion equipment, the Cities Service Industrial Heat Prover analyzes spent gases — registers *immediately* on two carefully calibrated dials the exact percentage of unconsumed fuel and oxygen.

This unique instrument is especially recommended for checking brass, aluminum and non-ferrous metal melting furnaces. It will work equally satisfactorily for checking all types of annealing ovens and core ovens. It has been used with every kind of fuel and with every type of burning equipment.

For information leading to demonstration of the Industrial Heat Prover, contact your nearest Cities Service office. The service is free and there is no obligation. May we suggest that you write today.

CITIES SERVICE OIL COMPANY

Chicago • Cleveland • Detroit • St. Paul • Cedar Rapids
Kansas City • Tulsa • Fort Worth • Shreveport
Milwaukee • New York

Silvery ingots are easier to handle. They can be unloaded, stored and delivered to the charging floor by magnet.
There is less silicon loss by oxidation during melting when Silvery ingots are used.
All the elements comprising Silvery ingots are essential to and recovered in the melt.
A composition of Silvery ingots can be readily checked by analysis to assure the foundryman that he receives what he pays for.
Melting of Silvery ingots progresses in a manner similar to that of other ingredients of the charge.

HANNATEN SILVERY IRON INGOT

Produced in silicon grades from 8% to 17%, HannaTen Silvery Iron Ingot makes it possible for the foundryman to control accurately the silicon in his melt . . . makes it unnecessary to carry several grades of pig iron in stock. The 10-pound ingot is easier to handle, more flexible in use, and provides a finer grain structure for stronger, more uniform finished castings. You'll like HannaTen Silvery Iron Ingot. Specify it for maximum savings.

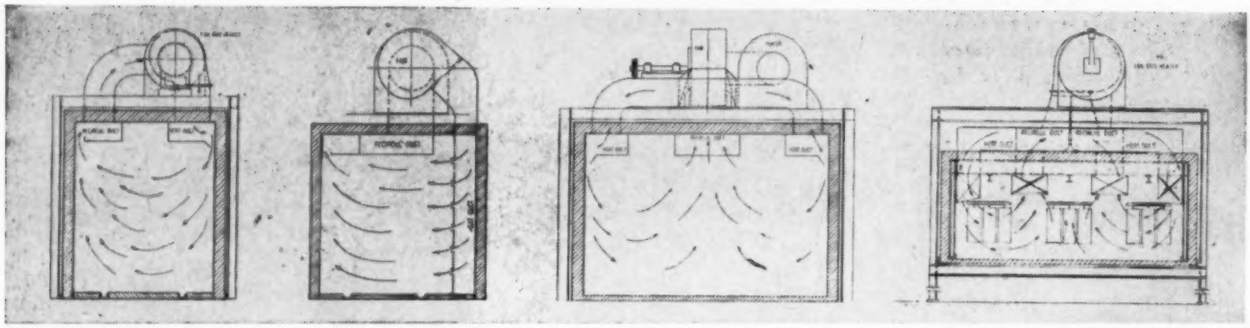
THE HANNA FURNACE CORPORATION

BUFFALO • DETROIT • NEW YORK • PHILADELPHIA • BOSTON

MERCHANT PIG IRON DIVISION OF NATIONAL STEEL CORPORATION

HOW TO PRODUCE BETTER CORES

Examples of Successful Gehnrich Recirculating Convection Heating Systems that Assure Uniform, Thorough Baking Most Efficiently — In Minimum Time

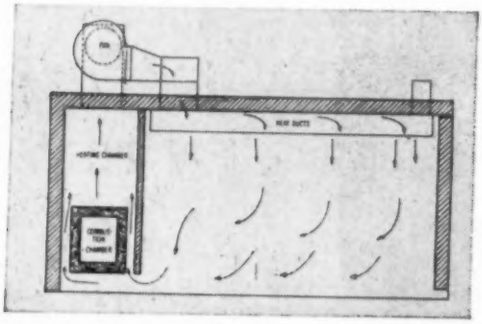


Cross Flow Circulation with heated air blown from a heat duct uniformly across a truck, rack or car of cores or molds, and recaptured via a recirculation duct at the opposite side of oven into the heater on the roof.

Cross Flow Circulation with heated air blown through louvres, in a heat duct extending full oven height, horizontally across trays, shelves or drawers of work, even on close centers, and recirculated to heater.

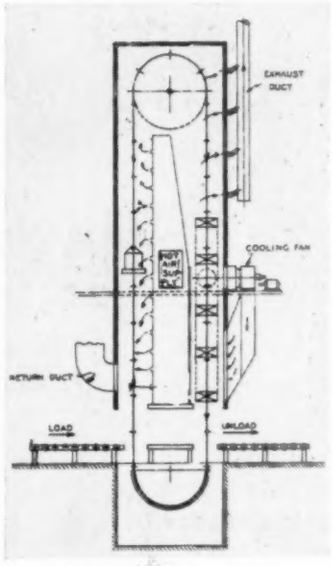
Double Down Flow Recirculation with heated air blown through ducts at both sides of oven and recirculated through a duct in the middle of the roof; recommended for batch loads in wide ovens or for work moving in tunnel ovens.

Double Down Flow Recirculation with heated air blown from sides of oven and recirculated through ducts in roof; recommended for work on racks moving on conveyors making several counterflow passes through oven; can be zoned for anydesired processing conditions.



Integral Recirculating Convection with heater section built inside oven housing but separated from baking chamber by insulated wall; heated air blown through top ducts at oven sides, and recirculated back into heater section. A very efficient, space saving oven for work loaded in large or heavy masses on cars, trucks or racks.

Cross Flow Circulation in Tower Ovens with heated air from external air heater or internal burners distributed horizontally, through a louvred duct, across the cores on carriers suspended from a conveyor moving through the evaporation, oxidation and cooling zones.



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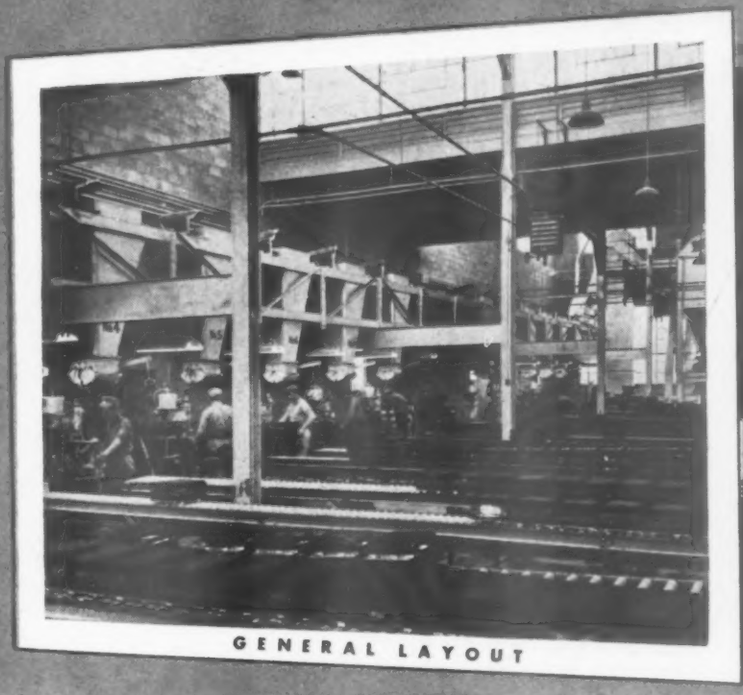

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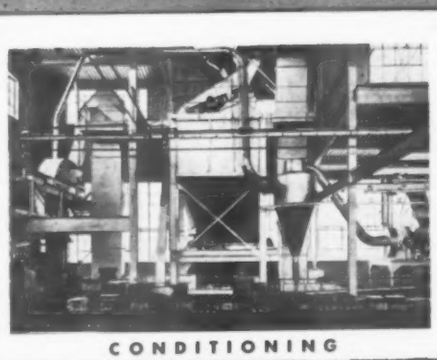

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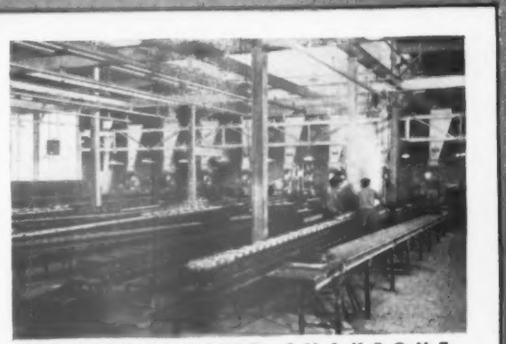

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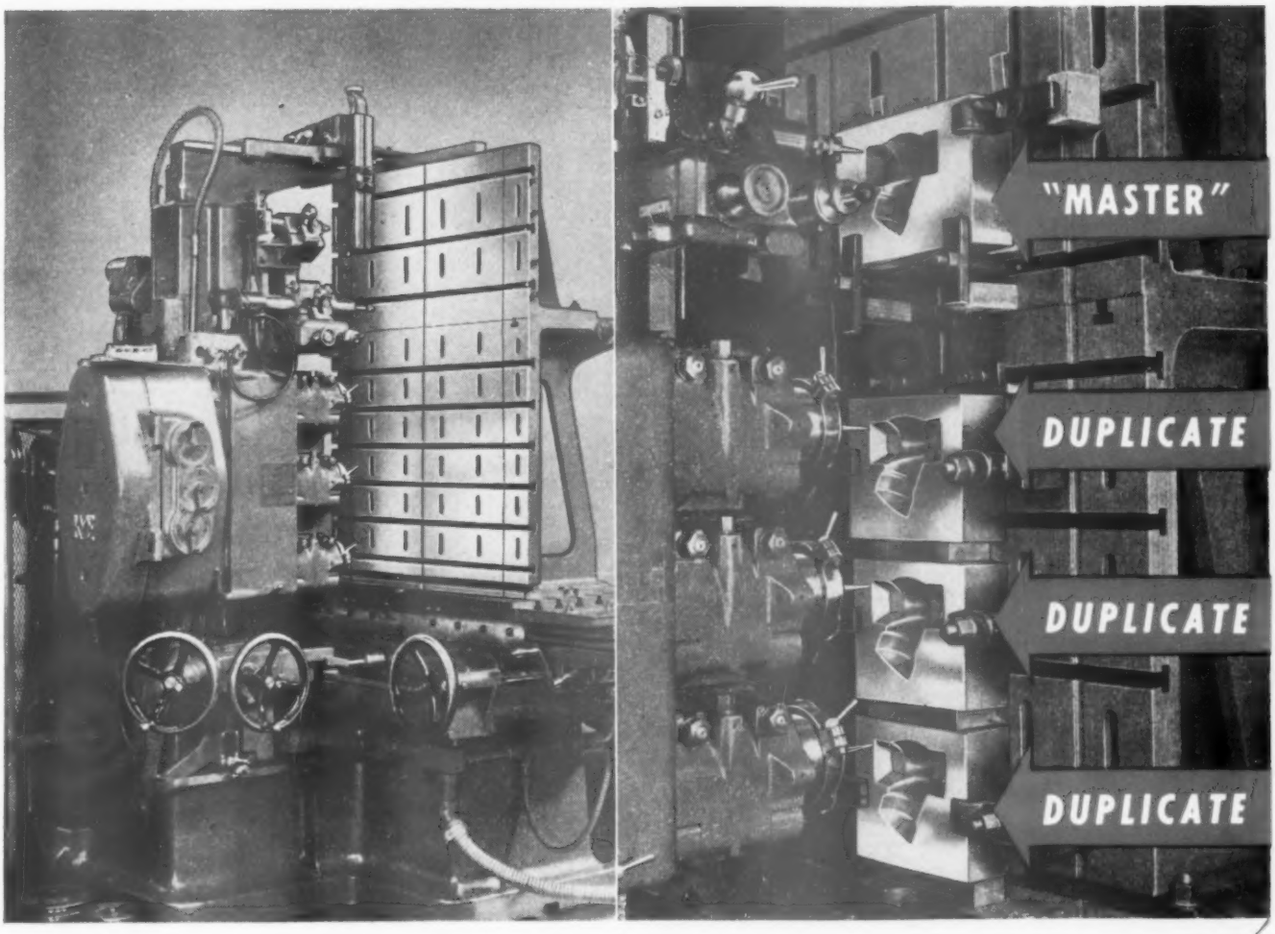

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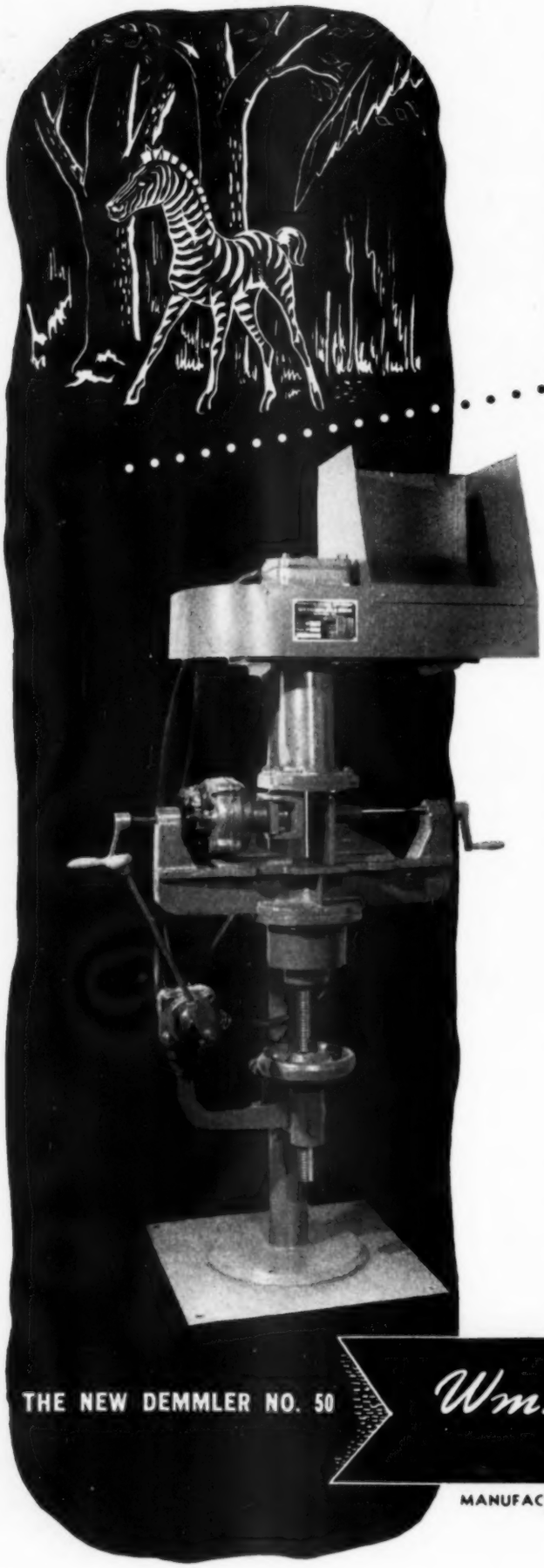

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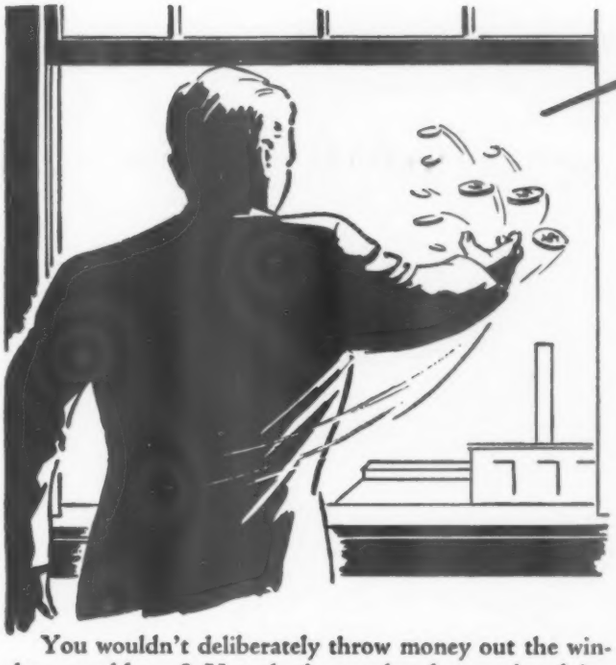

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What Does the Community Think of Your Company?

MANY foundrymen have become convinced that community good will is a most important asset in the successful operation of their business. Pride of the community in any manufacturing establishment, and friendship with its executive personnel, pay off in many ways. Frequently, with components such as castings, it will result in a greater demand for the product. But far more important, it has a healthy influence upon the type of worker who seeks employment at the plant.

At this time when many foundries are faced with the problems of increasing personnel to meet continued heavy demands for castings, the need for community backing is paramount. If the men and women of the town or city believe that management of a foundry is providing a good place in which to work, is paying good wages, has an interest in the welfare of the employees and in the civic growth of the community, and produces a first class product, the job of obtaining high grade, intelligent workers will be simplified greatly. Experience indicates returning servicemen provide excellent material for foundry training programs. These men are obtained readily if the community has confidence in the company and its management.

Community good will may be developed through a variety of projects on the part of the individual foundry, or through joint efforts of casting producers in the district. A foundry exhibit staged early in June by the Northwestern Pennsylvania Chapter of the AFA, and reported on page 88 of this issue, is an interesting example of successful group activity in selling an industry and its products to the citizens of a community. Results of the Erie show recommend its being tried by other chapters. In the past, several chapters also have participated in activities designed to sell young men on the splendid opportunities for advancement and the steady employment offered by the foundries of the district.

Many foundries have found the plant open-house an excellent method of winning friends among families of employees as well as among the remaining citizens of the community. Campbell, Wyant & Cannon Foundry Co. at Muskegon, Mich., was an early user of that type of sales effort. Hamilton Foundry & Machine Co., Hamilton, O., carries the idea a bit further, and in addition to open-houses for families of employees and the people of Hamilton, stages a special affair for the school teachers of the district.

The printed word offers another method of building good community relations. An interesting example of that type of public relations work is found in the beautiful booklet "Lebanon County Through the Centuries," recently published by the Lebanon Steel Foundry, Lebanon, Pa., which describes the early history and development of the iron industry in that county. Some companies, such as the Caterpillar Tractor Co., carry on a broad community relations program, as was described in the June issue.

Why not look around, Mr. Foundryman, and see if your efforts and those of your company measure up to the potentials of a good community relations program?

Frank G. Steinebach

Editor

Internal and External

HOT TEARS

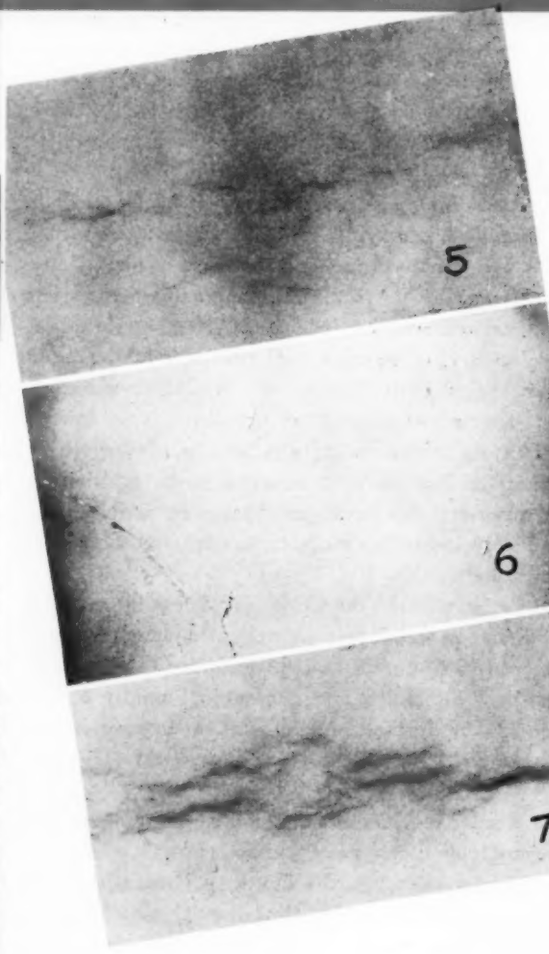


Fig. 1—External hot tear in cast steel pot

Fig. 2—External hot tear in torpedo tail cone

Fig. 3—External hot tear at junction of propellor blade and hub

Fig. 4—Typical external hot tear found in flat sections

Figs. 5, 6 and 7—Radiographs of external hot tears

Fig. 8—Mechanism of external tear formation. A—Mold surfaces soon after pouring. No hot zone present. B—Thin wall sections solidified, rib sections still partially molten. No hot zone present. C—Ribs almost solidified, with hot zones present and tearing bgun at "d"

The defect in steel castings commonly known as an internal hot tear is a crack within the casting resulting from shrinkage and inadequate feeding. The external hot tear, caused by restrained contraction, is visible on the surface. Since these two defects arise from different conditions and are remedied by unlike methods it is important that they be properly identified when observed on radiographs so that they can be eliminated in subsequent castings. The internal shrinkage tear and the external hot tear have individual characteristics which make their identification possible. Typical examples of both types are illustrated and discussed here.

By H. F. BISHOP
and
H. F. TAYLOR
Steel Casting Section
Naval Research Laboratory
Washington

BRIGGS AND GEZELIUS[1, 2] AND BRIGGS[3, 4] have pioneered the study of hot tears in the United States, particularly the effect of free and hindered contraction on carbon and alloy steels. It is felt, however, that they have not sufficiently explained the differences between external and internal hot tears, both as to their appearance and causes. External hot tears, when viewed on radiographs, have often been called internal hot tears, usually because they were too small to be readily seen on the casting surface. Radiographs of miscellaneous castings made at the Naval Research Laboratory indicated that internal and external hot tears have characteristics which make it possible to identify them. Furthermore, the internal and external tears are caused and eliminated by means so unlike as to make it necessary that they be considered as separate defects. The purpose of this work is to supplement that of Briggs and Gezelius with a more detailed description of the internal and external hot tear that emphasizes the appearance of each on radiographs.

The term "internal hot tear" is applied to a crack-like defect that commonly occurs in steel castings. This defect is not visible to the eye and thus is distinguished from the "external hot tear" which appears on the casting surface and extends toward the interior.

External hot tears have a rough, irregular appearance and form in castings soon after the metal has been poured. They are caused by interference with the normal contraction of the castings. This interference may be the result of one of two things —mold resistance or resistance due to the design of the casting where one part is restrained from contracting by other parts of the same casting.

External Tears Caused by Hot Spots

In addition to the presence of stresses which restrain contraction, one other condition must exist before an external hot tear can occur: a region must be present in the casting which is lower in strength than the rest of the casting. This weak area is usually the hottest part of the casting and is the point at which elongation or failure must occur. Hot areas are found at the gates or risers of the casting, at internal corners, or in heavy sections which are joined to lighter sections. When no hot zones are present the strains are distributed evenly throughout the casting; and, if the casting must deform to accommodate the stresses which resist its contraction, this deformation, which is extremely small, will occur uniformly throughout the casting. If a hot weak area is present, the deformation for the entire casting will occur at this localized area and may result in a hot tear.

Hall[5] and Briggs have cast steel into tensile bar molds contained in tensile machines and have broken the bars after solidification and cooling to the desired temperature. They found that at temperatures just below the solidification temperature, a plain 0.25 per cent carbon steel has practically no strength and ductility. As the casting cools, however, the strength builds up very rapidly. The ductility of the steel as measured by elongation remains below 1.0 per cent until a temperature of 2372 F (1300 C) is reached and then, as the temperature continues to drop, the ductility increases very rapidly. Thus it appears that a steel containing about 0.25 per cent carbon will tear at temperatures near the solidification temperature when both strength and ductility are low, and certainly will tear above 2372 F (1300 C) before the steel develops ductility.

Some external hot tears, easily recognized as such, are shown in Figs. 1 through 4. These tears are a result of the two conditions prerequisite to tearing, a hot weak zone and a stress which prevents normal contraction. Fig. 1 shows a cast steel magnesium melting pot gated through a blind riser placed at its bulge. Circumferential contraction of the pot was restrained by an extremely hard core, which caused

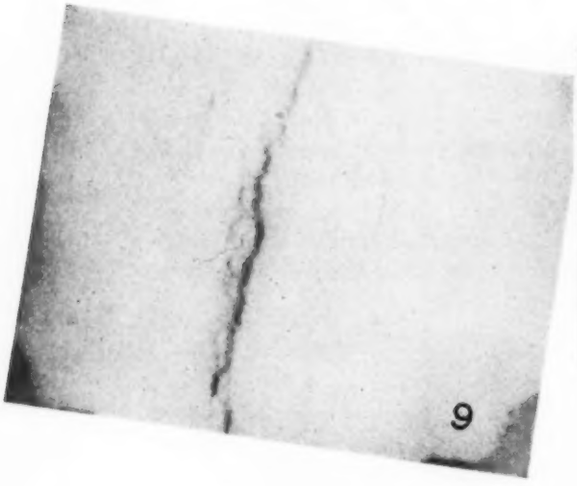


Fig. 9—Radiograph of external hot tears
Fig. 10—Radiograph of 6 x 8 x 1½ in. plate cast without risers
Fig. 11—Radiograph of 6 x 8 x 1½ in. plate fed by blind riser 2⅜ in. diam., 3 in. high
Fig. 12—Radiograph of 6 x 8 x 1½ in. plate fed by blind riser 3½ in. diam., 4 in. high
Fig. 13—Radiograph of 6 x 8 x 1½ in. plate fed by blind riser 3¼ in. diam., 3½ in. high
Fig. 14—Radiograph of 6 x 8 x 1½ in. plate fed by blind riser 4 in. diam., 5 in. high
Fig. 15—Radiograph of internal hot tears and conventional shrinkage
Fig. 16—Hot tear test specimen
Figs. 17 and 18—Radiographs of internal hot tears in vertical position
Fig. 19—Casting of Fig. 16 risered to produce shrinkage tears
Fig. 20—Radiograph of center section of casting shown in Fig. 19

the tear to occur at the hot zone beneath the riser. Until this mold was filled to the level of the riser, all of the metal entering the mold flowed over the area where the tear occurred, preheating it and making this zone hotter than the remainder of the mold. This casting was made sound by using a hollow core made of green sand so that it was easily broken by the contraction stresses.

Fig. 2 shows a cast steel torpedo tail cone containing external hot tears. The heavy ribs on the outside of the cone cause hot zones to develop, and again the stresses are caused by contraction of the casting against the core. The tears in the tail cone can be eliminated either by using a weak core, or by chilling the ribs so that their solidification rate is accelerated and the metal strength at the ribs is then comparable to that of the thin walls adjacent to them.

Mechanism of Hot Tear Formation

Fig. 3 shows a section of a four-bladed propeller with an external hot tear at the junction of the blade and hub. The hot zone is the internal corner at the junction. The curvature of the blade prevents it from contracting toward the hub and hence tearing occurs.

Fig. 4 is a photograph of a typical external hot tear found in flat sections.

The mechanism of external hot tear formation is illustrated in Fig. 8 for a section through the tail cone shown in Fig. 2. In *A* of Fig. 8, the tail cone is shown soon after pouring. The skin thickness of the solidified metal on the core surface of the mold is uniform because, as Briggs and Gezelius have pointed out, the thickness of the solidified skin is the same regardless of section size. While this conclusion does not hold for large sections, it is essentially correct for the section sizes discussed herein. Thus, although the rib section is about 2½ in. in thickness and the section adjoining it is only about ¾-in. in thickness, the initial solidification rate is the same. The heat extracted by the core is almost entirely heat of fusion.

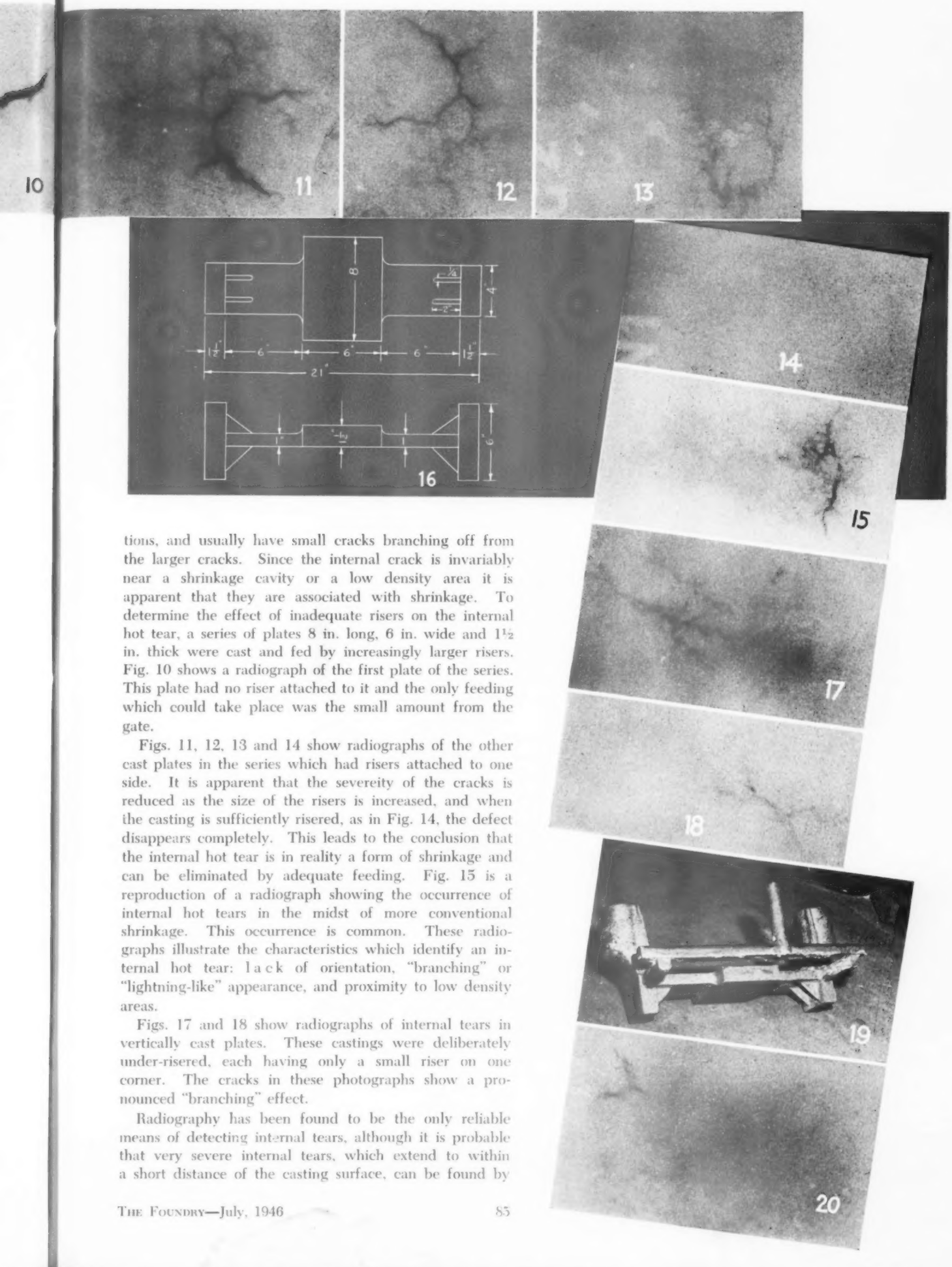
Illustration *B* represents the tail cone when the sections adjoining the ribs have just completed solidification. However, the rib sections, since they are of greater mass, are still partially liquid. After this stage in the cooling, the hot zone is beginning to form; further heat extracted from the thin section by the core serves entirely to cool this section, while heat extracted from the rib section is still heat of fusion evolved in further solidification. Since the surfaces beneath the ribs are hotter than the remainder of the casting, they are also weaker and become points favorable for the occurrence of hot tears.

In the case of the magnesium pot, although its cross section was uniform, the tear occurred at the last part to solidify. All of the metal flowed over the sand at the zone where tearing occurred, thus preheating the sand so that it was less capable of removing heat from the metal, which finally came to rest in the region of the tear. The result was that, after the remainder of the casting had solidified and was cooling, the metal in the mold beneath the riser was still giving off heat of fusion to complete its solidification.

These external hot tears of Figs. 1 through 4 are all severe and easily detected on the castings. More frequently, however, they are slight and are obscured by the oxide on the casting surface. Frequently they are not discovered until the casting has been radiographed; but, after a thorough sandblasting and careful examination of the area containing the tears, they can usually be seen directly.

Figs. 5, 6, 7 and 9 show radiographs of external hot tears. These radiographs were reduced in reproduction to half their original size. External hot tears are parallel wavy cracks running in a direction perpendicular to the axis of stress. They do not have branches leading from them, but may exist as individual short parallel cracks in roughly an echelon formation.

Internal hot tears are found in imperfectly fed castings. They differ in appearance from the external tears in that they have no particular orientation, may run in all direc-



tions, and usually have small cracks branching off from the larger cracks. Since the internal crack is invariably near a shrinkage cavity or a low density area it is apparent that they are associated with shrinkage. To determine the effect of inadequate risers on the internal hot tear, a series of plates 8 in. long, 6 in. wide and 1½ in. thick were cast and fed by increasingly larger risers. Fig. 10 shows a radiograph of the first plate of the series. This plate had no riser attached to it and the only feeding which could take place was the small amount from the gate.

Figs. 11, 12, 13 and 14 show radiographs of the other cast plates in the series which had risers attached to one side. It is apparent that the severeity of the cracks is reduced as the size of the risers is increased, and when the casting is sufficiently risered, as in Fig. 14, the defect disappears completely. This leads to the conclusion that the internal hot tear is in reality a form of shrinkage and can be eliminated by adequate feeding. Fig. 15 is a reproduction of a radiograph showing the occurrence of internal hot tears in the midst of more conventional shrinkage. This occurrence is common. These radiographs illustrate the characteristics which identify an internal hot tear: lack of orientation, "branching" or "lightning-like" appearance, and proximity to low density areas.

Figs. 17 and 18 show radiographs of internal tears in vertically cast plates. These castings were deliberately under-risered, each having only a small riser on one corner. The cracks in these photographs show a pronounced "branching" effect.

Radiography has been found to be the only reliable means of detecting internal tears, although it is probable that very severe internal tears, which extend to within a short distance of the casting surface, can be found by

magnetic powder testing methods if a very high current is used. The magnetic powder test is ideally suited for detecting external tears. Very minute external tears, which may not be found by radiography, are disclosed by the magnetic powder test.

It is important that the internal and external hot tears be identified correctly and considered as different defects, because the methods of preventing them are completely different. In fact, the remedy for the internal or shrinkage tear may make conditions favorable for the external hot tear to form.

Two castings were made with dimensions as shown in Fig. 16. One casting was made as shown in Fig. 19 with open risers on each flange. It is obvious that there must be shrinkage in the center portion of this casting because it is impossible to feed the 1½-in. center section through the 1-in. thick members which join the center

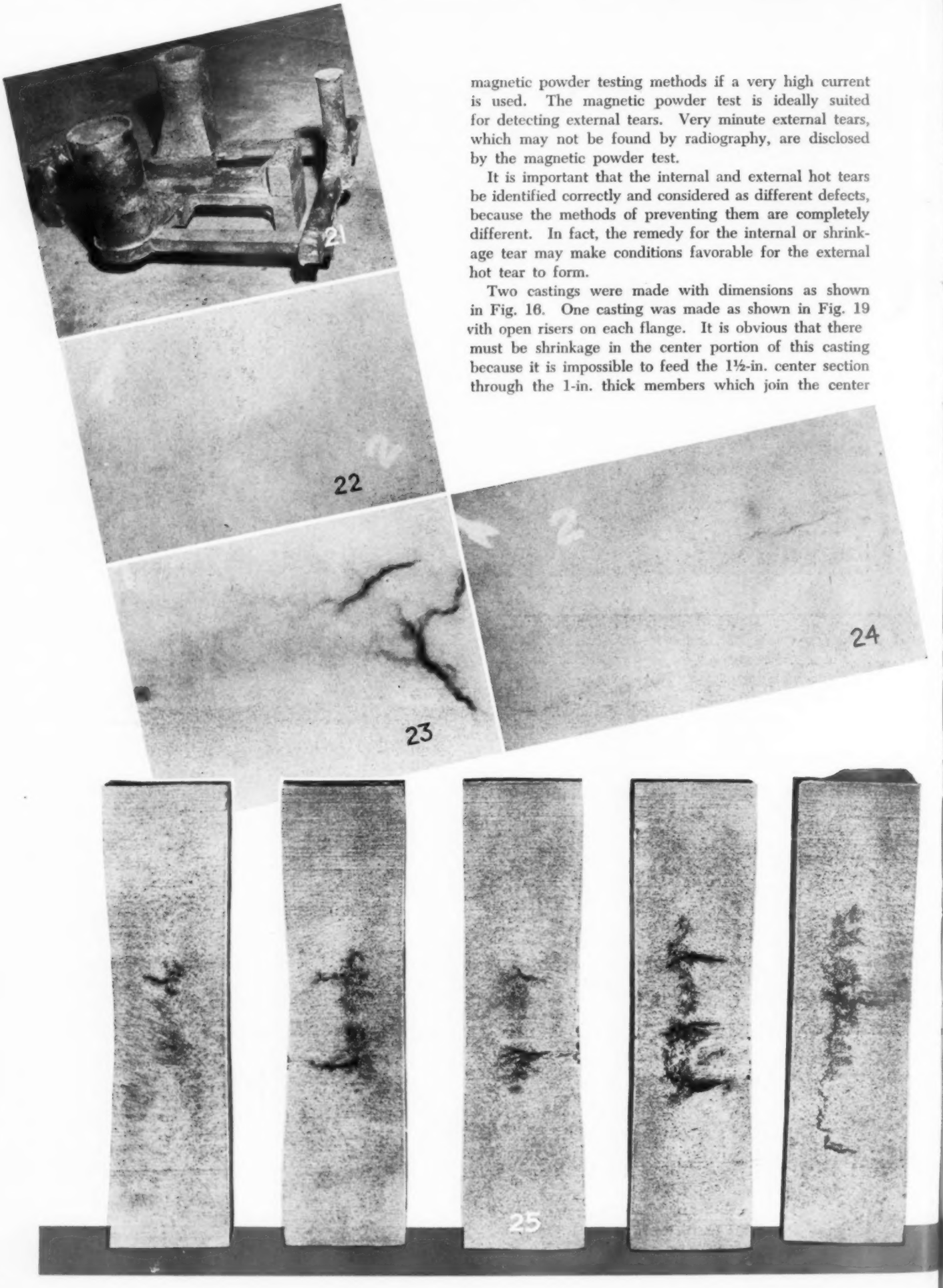


plate to the flanges. Fig. 20 illustrates the radiograph of this section and shows how part of the shrinkage occurred in the form of cracks or internal hot tears. Risers attached to the center plate section should eliminate the internal tear.

Such a casting was made as shown in Fig. 21, with risers on each side of the plate and chills on the back of the flanges. The risers were large enough to make the casting sound; but when the center plate of this casting was x-rayed, it was found that although the internal tears had been eliminated, external tears were present, as can be seen in Fig. 22. The risers, because of their mass and the fact that the metal was gated into them, intensified the hot zone at the center of the casting, and with contraction restrained by the molding sand between the flanges, external hot tears resulted.

The correct way to make this casting sound is to use the risering method shown in Fig. 19 but to chill the center plate section so that it freezes before the 1-in. members, thus allowing solidification to begin at the center and proceed progressively in each direction toward the risers. Correctly designed chills, properly used in certain applications such as the casting described previously, will eliminate both internal and external hot tears. The shrinkage defect is eliminated because of the accelerated rate of solidification of the metal adjacent to the chills; the chill at the same time strengthens the metal in this area by rapid cooling so that it can resist the stresses which would cause external tears. If the chills are improperly used they will serve only to move the defects elsewhere in the casting.

Fig. 23 shows a radiograph of a cast steel plate containing internal tears or shrinkage cracks, and Fig. 25 shows sections of this plate cut through the defect. Fig. 24 shows a radiograph of a similar plate containing external tears, while Fig. 26 is a photograph of sections cut from this plate perpendicular to the tears. The specimens of Figs. 25 and 26 were etched with a 50 per cent hydrochloric acid solution to show the defects in greater detail.

Although the specimens of Fig. 26 appeared completely free of shrinkage, the etching treatment disclosed centerline weakness in some of the specimens. It will be noticed that the external tears are widest at the surface and diminish in width as they extend inward toward the casting interior, while the opposite relation holds true for internal tears.

While the authors are convinced that internal tears are closely allied with shrinkage and that all internal tears can be eliminated by adequate risers, they can advance no explanation of the mechanics of internal tear formation, although several theories are being considered and it is planned to conduct experiments to test their validity.

Conclusions—The internal hot tear which can more accurately be called a shrinkage crack, and the external hot tear, which is a tear in the (*Please turn to page* 218)

Fig. 21—Casting of Fig. 16 risered so that external hot tears will form

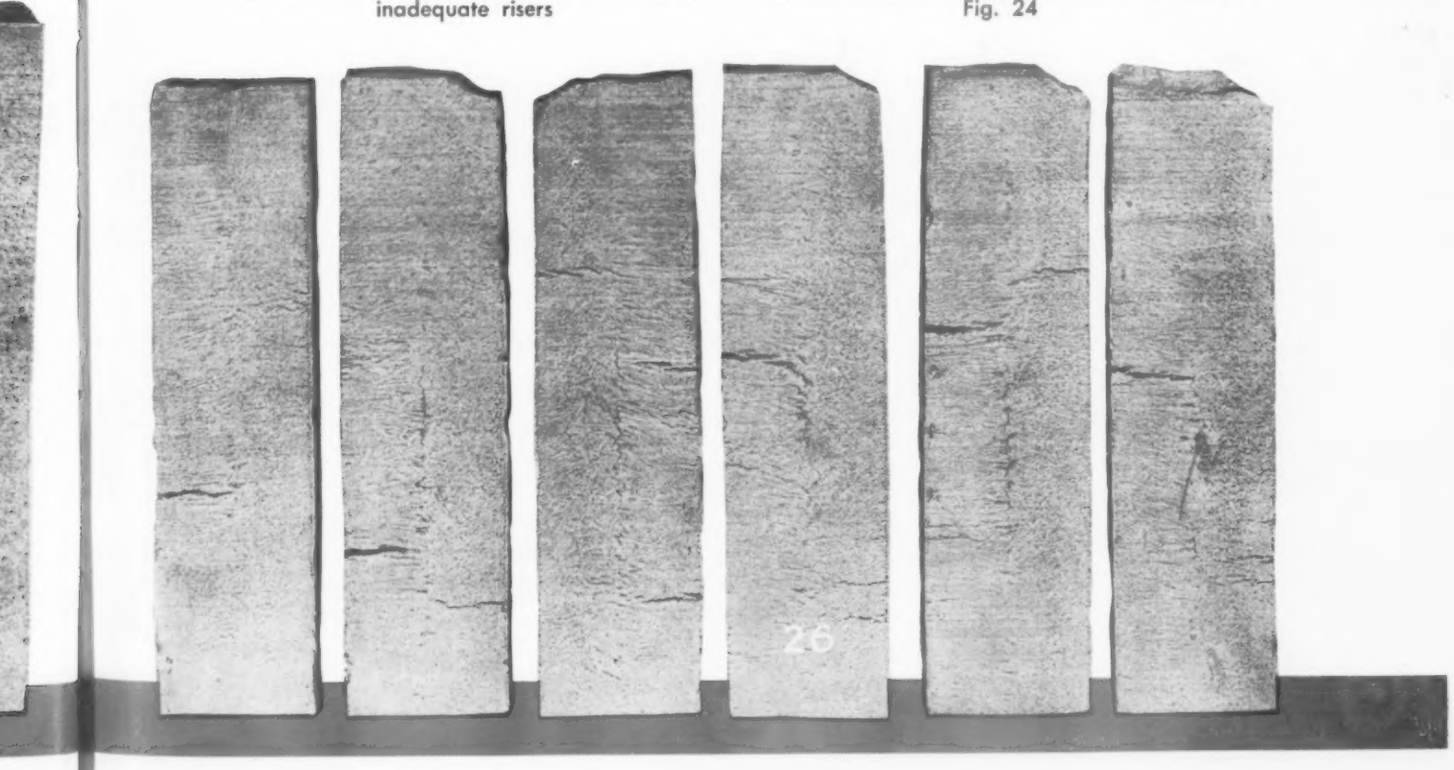
Fig. 22—Radiograph of center section of casting shown in Fig. 21

Fig. 23—X-ray of internal hot tears caused by inadequate risers

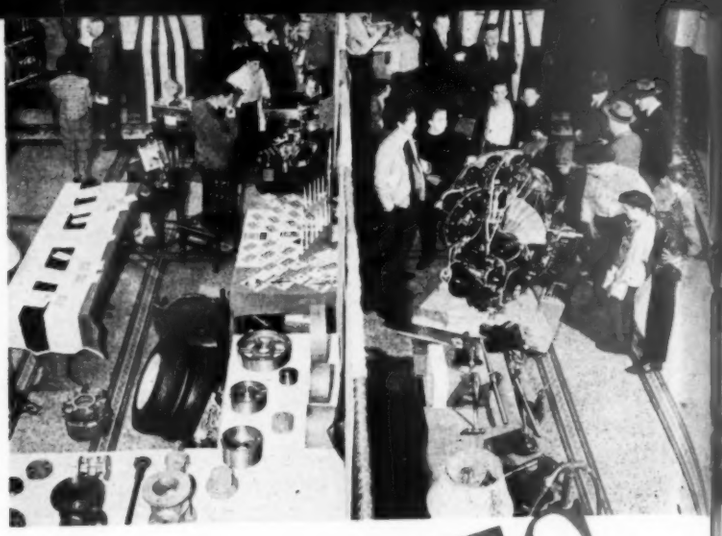
Fig. 24—X-ray of external hot tears caused by mold resistance

Fig. 25—Sections through internal hot tears of Fig. 23

Fig. 26—Sections through external hot tears of Fig. 24



Erie learns about FOUNDRIES



Some of the displays in the recent Foundry Exhibit at the Erie, Pa., YMCA. Left—Part of the lobby booths where finished castings were shown (Photo by *Erie Daily Times*). Center—This exhibit of patterns of various types included demonstration of how wood patterns are made. Right—Samples of cores were part of the display of foundry processes and products

A good way to "sell" an industry was demonstrated last month by the Northwestern Pennsylvania Chapter of AFA and the Erie Foremen's Association. Their Foundry Exhibit effectively portrayed the importance of castings and the employment opportunities of the industry

CITIZENS of Erie, Pa., know considerably more about the foundry industry than they did prior to last month. Castings have been a familiar product to that city for many years—with more than 25 producers of castings in the city itself Erie is the third largest foundry center of Pennsylvania—but the industry probably never before has been publicized, there or elsewhere, as effectively as was accomplished by the Foundry Exhibit held at the Erie YMCA, June 5, 6, and 7, by the Northwestern Pennsylvania Chapter of the American Foundrymen's Association and the Erie Foremen's Association. While the exhibit was largely an Erie affair, participants included chapter members from other centers which are part of the Northwestern Pennsylvania area.

By WILLIAM G. GUDE
Managing Editor
THE FOUNDRY

Unlike the average industrial exhibit, this one was developed to "sell" an industry rather than the products of the individual exhibitors. The various displays of approximately 40 companies— including casting, pattern, equipment and supplies producers—were designed to demonstrate what castings are, where they are used and how they are made, while the show as a whole convincingly portrayed the economic importance of cast products and the employment opportunities offered by the foundry industry. As such it proved highly interesting to nearly 6000 students and adults who crowded the exhibit rooms each of the three days. Admission was by tickets, either purchased at the door or distributed previously by district plants.

Displays were arranged with finished castings shown in the first floor lobby and foundry processes demonstrated in the gymnasium and adjoining room of the second floor. Of particular interest in the products display was a General Electric 1-40 jet propulsion engine of the type used in the P-80 "Shooting Star." Various aspects of patternmaking were shown in one of the second floor rooms, these including not only numerous samples of different types of patterns but also a practical demonstration by an expert patternmaker of the art of making a wood pattern.

Demonstrations of molding and coremaking were conducted in the gymnasium. Under the guidance of plant men visitors were invited to ram up a mold at a bench or squeezer machine or to try their hand at simple coremaking—and invariably there was a lineup of young boys at these stations anxious to sample actual foundry work. Numerous other exhibits filled this floor, including samples of cores, ingot metal, sand and sand testing equipment, castings in the as-cast condition and after cleaning, and various other materials and equipment which are commonly used in foundry operations.

Several times each day movies were shown in a second gymnasium, adjoining the main one and seating about 250 people. These pictures, relating to the use of castings, were followed by a short talk by Herbert F. Scobie or Frank E. Wartgow, of the national AFA staff, in which the importance of the foundry industry and the opportunities it offers as a career were discussed. At the conclusion of each program a drawing was held for three door prizes. Additional information on the advantages of foundry employment was made available in the AFA booklet, "The Foundry Is a Good Place To Work," which was distributed at the various booths.

On leaving the exhibit students could take with them an entry blank for an essay contest sponsored by the Northwestern Pennsylvania Chapter. Three prizes, totaling $50, were offered to male high school students for the best essay on the subject "Why I Would Like To Work in a Foundry."

In addition to the publicity accruing to the foundry in-

Left—Angelo Iavarone, Urick Foundry Co., demonstrates coremaking practice while his father, Dan Iavarone, coremaking department foreman of the company, explains the work to the assembled high school students. (Photo by *Erie Daily Times*)

Above—General view of the gymnasium exhibits. Visitors were invited to try their hand at the molding bench and machine in the center of the area

Left—Students examining castings in a G-E 1-40 jet propulsion engine, the type used in the Lockheed P-80 "Shooting Star." (Photo by *Erie Daily Times*)

dustry through the exhibit itself, the event was given considerable space by the local newspapers, while a 15-minute radio broadcast direct from the exhibit at 12:30 p.m. each of the three days brought the story of castings to other audiences. Business, civic and educational leaders of the city and county participated in the official opening, June 5, which also was broadcast. At noon on the closing day a jet-propelled plane from Wright Field, Dayton, O., made a pre-arranged flight over Erie, attracting much attention.

In fact, it would have been difficult during the three days of the exhibit for anyone in the Erie district not to have become at least aware of the existence of the foundry industry. And although the exhibit to a certain extent was an experiment, the interest it aroused attests to its success and to the soundness of the idea behind it.

Considerable credit is due the exhibit sponsors as groups for their combined initiative and thoroughness in the preparation and conduct of the show and to the committee responsible for handling the details. The committee, headed by Roger W. Griswold Jr., Griswold Mfg. Co., and first chairman of the Northwestern Pennsylvania Chapter, included Earl M. Strick, Erie Malleable Iron Co.; Clyde Cooper, Keystone Brass Co.; Jack Gill, Gill Pattern Works; L. A. Dunn, T. M. George and D. M. Bole, General Electric Co.; William Miller, Frederic B. Stevens Inc.; B. D. Herrington, Hickman, Williams & Co.; J. A. Shuffstall, National-Erie Corp.; Frank Warner, Griswold Mfg. Co.; Ralph Wedgewood, Pickands Mather & Co.; Roy Loder, Erie Malleable Iron Co.; H. H. Neebe, Bucyrus-Erie Co., and Nate Harrington, Erie YMCA.

Controlling Aluminum Melting Temperature

By WAYNE H. GUNSELMAN
Director of Research and Foundry Engineer
Samuel Greenfield Co. Inc., Buffalo

IN THE introduction to the second edition of *Gates and Risers for Castings* the statement is made that unanimity of opinion never exists between one foundryman and another in regard to the methods of gating and risering aluminum castings. The author presented the various aspects of gating nominal aluminum castings to a degree that will be appreciated by all connected with the foundry industry, and very carefully explained the merits and disadvantages of all styles and methods of gating, with the constant reminder that what applies to one casting does not necessarily apply to another. Only the basic principles of many means of gating should be applied to any given casting by any given foundry.

While generally agreeing with all procedures described in comments on aluminum alloys, there are several items to which I violently disagree. In paragraph 3, page 232, chapter XVII the author states "The temperature attained in the furnace will not affect the metal, provided proper attention is paid to temperature at which the metal enters the mold."

It is claimed that this statement is based on an unbiased investigation. I cannot agree with this statement. It has been my experience that the maximum temperature attained in relation to the pouring temperature of the casting has a very decided effect on the ultimate grain size and soundness of the casting. The degree of variation between maximum temperature and pouring temperature is just as critical as pouring the casting at the proper temperature.

Melting Temperature Important Feature

During the war years, I held the position of chief metallurgist at one of the largest aluminum foundries in this country. We found through constant correlation of pouring temperature data, melting data and physical test results, that this variance played an extremely important part. It became necessary that we limit the degree of variance betwen maximum temperature attained in the melting furnace and pouring temperature of the castings to 50 F. If a casting was to be poured at 1300 F, the metal could not exceed 1350° in the melting crucible. If it did, it either was pigged or used in pouring a casting or a series of castings which had higher pouring temperatures. All temperature checks were made through recording pyrometers in the melting furnace as well as at the pouring station check immediately before pouring subject castings.

Quoting from melting specifications of the subject company with regard to melting furnace practice—Item 5: "Metal should be heated uniformly to nitrating temperature 1150-1225 F. The recorder on each furnace must show a vertical or falling-off alignment of at least 2 dots before nitrating is permissible. Upon completion of the nitrating operation, the maximum temperature the metal may reach in the melting furnace shall be 50° over the pouring temperature of subject castings to be poured from said heat. The furnace must show a vertical or falling-off alignment of at least 2 dots for ascertainment of the maximum temperature the metal attained. Metal exceeding the allowable temperature maximum is to be pigged or should be used in the pouring of castings with a higher allowable maximum temperature."

Also, along the line of thought that previous thermal history does not affect the properties of castings as long as the castings are poured at a given temperature, the following quotation is from the Wright Aeronautical Specifications used in conjunction with pouring aeronautical cylinder heads from XA-142 alloy: "During the melting, the metal shall be heated to a temperature not over 1450 F. The molten metal shall be poured into the mold and shall not exceed a temperature of 1420 F. Written permission must be obtained from the purchaser by letter or note on the drawing before deviating from the requirements of this paragraph."

To my knowledge, particularly in a plant producing 30,000 heads per month for several years, no deviation was allowed from this 1450° maximum melting and 1420° pouring temperature. Current literature of the Aluminum Co. of America emphatically states that the degree of variance between maximum temperature obtained and pouring temperature of the casting should be held to the closest possible minimum for insuring the best results. Recent work at Case School of Applied Science for the Aluminum Research Institute also bears out the foregoing statements that maximum temperature should not exceed 50° over the pouring temperature of subject parts.

While still connected with the foundry in Cleveland, we ran a series of experimental tests to ascertain definitely what effect high temperature variations had on ultimate strength, yield strength, elongation and general structure of the metal. The experimentation was conducted as follows:

We selected 1250 F, as the temperature for pouring the test bars. A pot of metal was heated to 1600 F and alternatively cooled in steps of 50 F. (*Please turn to Page* 216)

This discussion of cupola operations is confined primarily to melting problems of the small gray iron foundry. It comprises a paper presented by the author before the recent sixth New England Foundry Conference at Cambridge, Mass.

Cupola melting of Cast Iron

By DONALD J. REESE
International Nickel Co. Inc.
New Yo k

THIS discussion is intended to deal primarily with problems of the melting department of a small gray iron foundry. Such problems include equipment, raw materials, operating techniques, chemistry, metallurgy, ladle treatments, metal distribution, pouring temperatures, pouring rates and those factors which determine whether products are sound, machinable, or of sufficient quality to render an adequate service performance. These latter factors are concerned with visual or hidden defects, hard spots, casting stresses, dimensional precision and certification that the desired mechanical properties are present in the parts produced.

I am very much disturbed when one of my associates tells me the management or operating men of the So and So Foundry Co. prefer an effortless solution to the problem at hand rather than one which may require a major correction of faulty procedures. I operate on the premise that faulty procedures are intolerable. Faulty procedures mean production costs higher than need be, product quality less than need be, and supervision burdened with unnecessary repetitive detail. Nothing that will be stated here is of value if the human element in management and operations is unwilling to direct its efforts to establishment and maintenance of standard.

For purposes of definition let us consider a small gray iron foundry as one operating a 36, 42 or 48 in. cupola, or melting up to 10 to 20 tons of metal per day. For equipment we require a cupola, a cupola blower and motor, a pipe connection between cupola and blower, a means of weighing cupola charge materials, a means of elevating cupola charge materials from the yard level to the charging floor, and a means of disposing of metal at frequent intervals throughout the melting period. If these minimum facilities are adequate, and if they are properly utilized, a very satisfactory melting operation can be expected. Two of these items are likely to be maladjusted to an optimum melting performance; the cupola blower is likely to be inadequate either in design, horsepower or conditions of application, and the scales for weighing cupola charge materials may not be suitable for precision weighing of fuel and components of the metal charge.

Lack of inclusion in the foregoing list of such facilities as air weight control, preheating or air conditioning, mechanical charging equipment or slag handling equipment—all of which has its proper place—is because it is much less likely to fit into the pattern of a small foundry

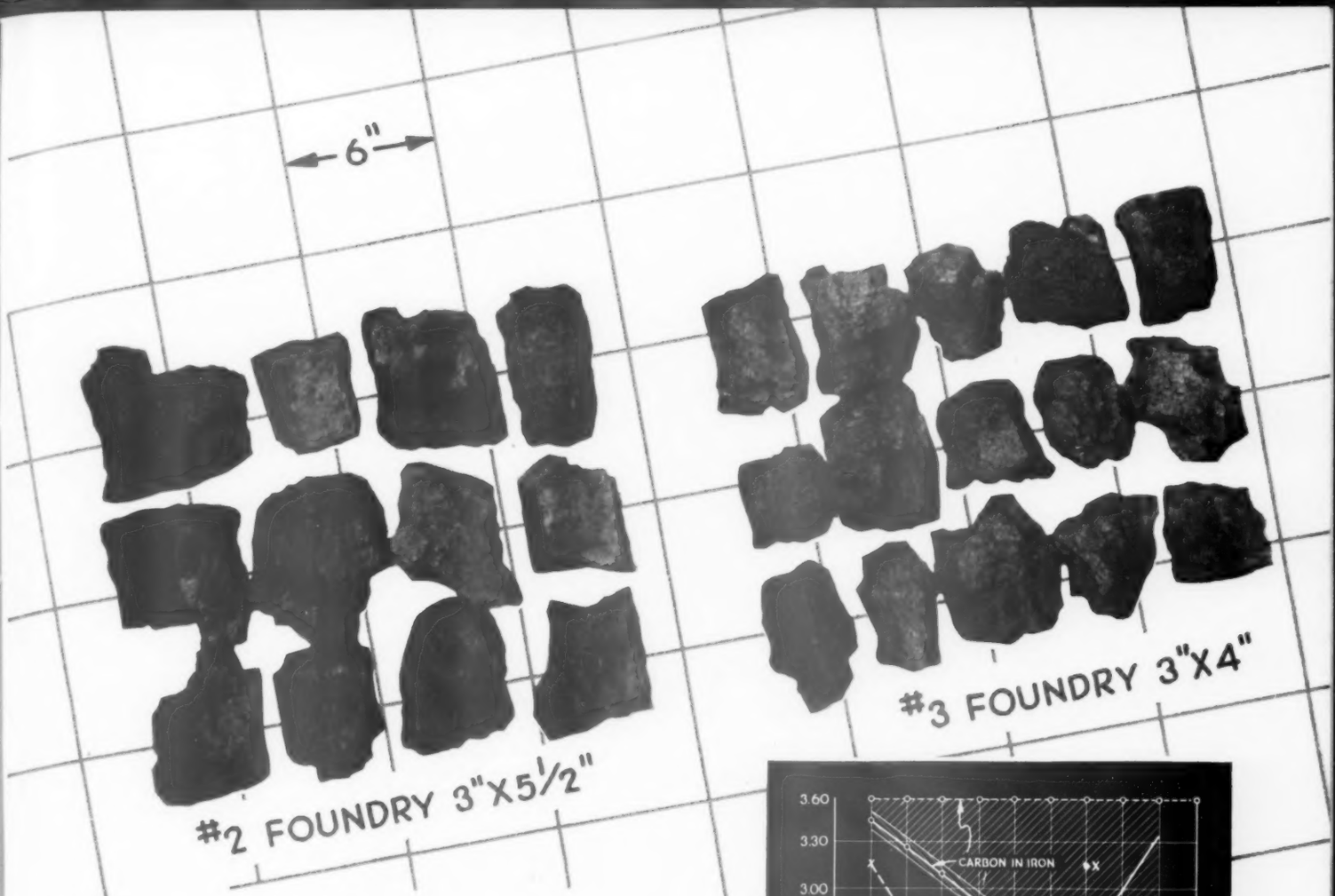
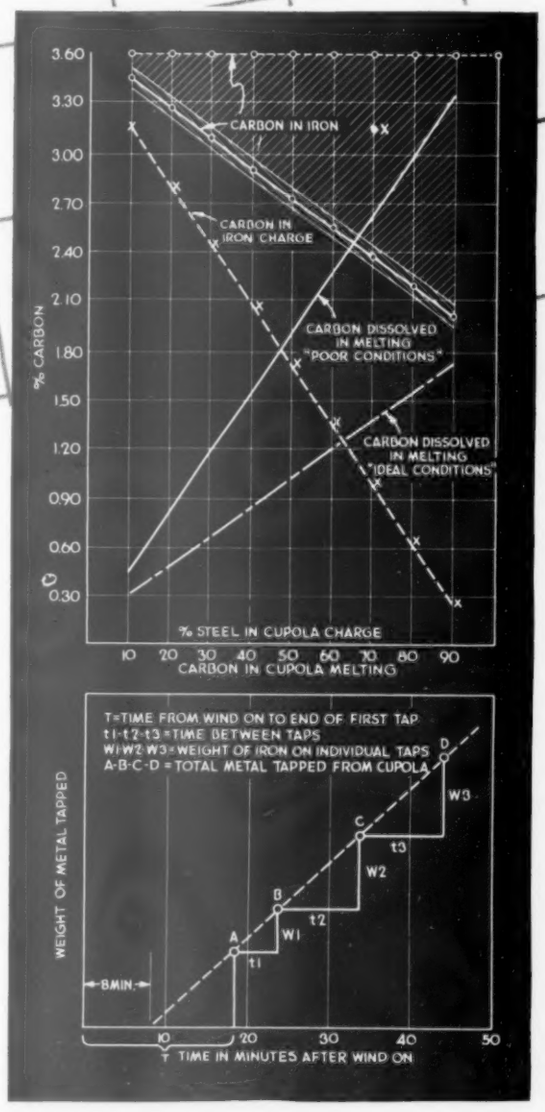


Fig. 1 (above)—Illustrating relative sizes of Nos. 1, 2 and 3 foundry coke

Fig. 2 (right)—Chart plotting carbon in metal tapped from a cupola against carbon in metal charged. For example, when carbon in charge is 2.40, carbon in cupola product is 3.05

Fig. 3 (below right)—Time-tonnage chart used to appraise cupola performance. Such studies may help to determine: Differences in operation from day to day or hour to hour; correct coke bed height; correct time for first tap; true melting rate; tendency of cupola to bridge over, etc.



operation than in that of a large foundry.

Considerable significance should be attached to the suitability of the cupola blower. We need a blower that will deliver whatever quantity of air is required against whatever resistance or wind box pressure is incurred in a good melting operation. Under ordinary conditions the blower should be able to deliver 450 cu ft of air per minute against a resistance of 16 oz for each ton of iron melted per hour, but the blower should have some reserve capacity, and if it was designed and horsepowered to deliver 600 cu ft of air per minute against a resistance of 32 ounces, per ton of iron per hour, it would be flexible enough to meet practically any requirement of the melting department.

It is a common fallacy in cupola operations to overemphasize the less important items that concern the process and to underemphasize the more important items. Few foundrymen can resist overemphasizing the importance of tuyeres. They know about the (*Please turn to page* 197)

Eliminating Defects in Nonferrous Centrifugal

By NATHAN JANCO
Centrifugal Casting Machine Co.
Tulsa, Okla.

AN INCREASING number of foundries are producing quantities of nonferrous bushings and similar cylindrical shapes through the use of the true centrifugal casting process. Under this method, the metal is poured into a mold which is rotating about its own axis, and solidification is permitted to progress only from the outside diameter toward the center.

While many operators have experienced little or no difficulty in producing large numbers of perfect bronze and brass bushings, others have had considerable trouble in eliminating certain defects from their product. Sometimes these flaws are caused by incorrect casting procedures; other times they result from unfavorable conditions which are not a part of the actual pouring process.

In either case, however, a full understanding of the principles of true centrifugal casting will not only aid in correcting the more common defects to be discussed in this article, but also will materially assist the operator in diagnosing and eliminating other defects which might be encountered.

To obtain the greatest possible success with centrifugal casting methods it is first necessary to minimize those outside influences which are not a part of the actual pouring process, but which can cause unsatisfactory qualities in the product. One of these is dissolved gas, either in the mold or in the metal itself. This gas, when released during the pouring period, can and will cause holes in the casting.

Cast iron or steel molds are very likely to have casting strains as well as dissolved gas in them. Normalizing these molds will not only drive out the imprisoned gas, but also will prevent the molds from breaking on the very first cast, as sometimes occurs.

Gas in sand molds can be minimized in a variety of ways. Ventilation holes in the flask will permit gases generated in the mold material to escape outward into the atmosphere rather than into the mold cavity. When necessary, the molds can be oven dried to reduce the moisture content; and, if it is deemed advisable, permeability of the sand can be increased so that the gas can escape more readily.

While centrifugal casting often will eliminate gas from the metal, even though it may contain a considerable amount, gas remains in the metal in enough instances to justify taking steps to hold the gas content of the melt to a minimum.

This trouble seldom is encountered when any of the various types of electric furnaces are used. With oil- or gas-fired furnaces, gas in the metal often can be traced to the fuel-air ratio. The optimum flue gas analysis which does not produce a gassy condition in the melt can be determined experimentally by using an Orsat apparatus. Once the correct analysis has been determined, exhaust gases should be checked periodically to make certain that variations in fuel quality, pressure changes and similar factors have not affected the fuel-air ratio.

Another condition which can cause trouble is vibration in the machine. This will cause what is termed a laminated casting. Vibration in a centrifugal casting machine should be held to an absolute minimum by proper mounting, careful balancing of the molds, and frequent inspections of the rollers, bearings, and other vital moving parts.

Consider Operator-Controlled Factors

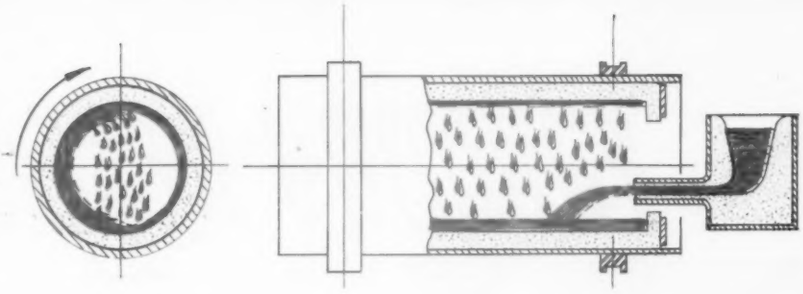
With potential sources of defects eliminated from the metal, mold and machine, consideration can then turn to the major operator-controlled factors which make up the actual casting process. They are: Pouring temperature, pouring rate, rotational speed of the mold, and the rate and direction of cooling within the poured metal.

Since these factors are so closely interrelated, the correct control of each is to a large extent dependent upon the value of the others. A sound understanding of the function and effect of each will greatly assist the operator in producing perfect castings by enabling him to find the best combination for the particular job at hand without having to rely upon sheer luck.

To illustrate this point, suppose an operator wished to cast cylindrical bushings of different wall thicknesses, from the thinnest to the very thickest possible.

To obtain the thinnest possible wall section he would pour the metal at the highest practicable rate and at the highest practicable temperature. Rotational speed of the mold would be above normal. He would use the high pouring rate and rotational speed to get the metal into

Castings



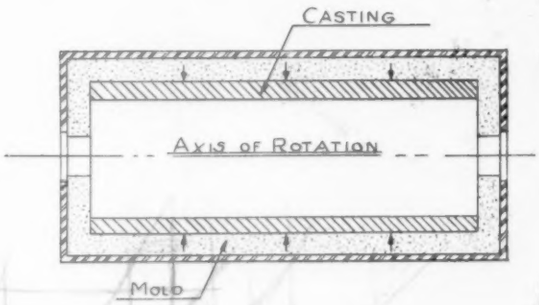
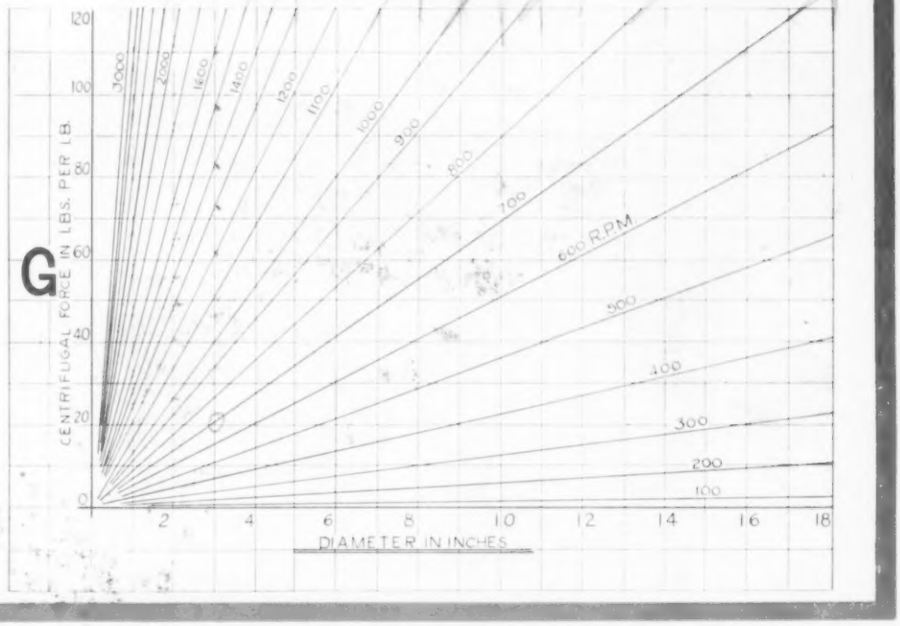


Fig. 1 (top)—End and side views of rotating mold in which excessive rate of pour results in "raining" because metal entering the mold does not quickly reach a sufficient rotational speed to hold it against the inner wall of the mold

Fig. 2 (center) — Cross section of mold for producing castings by the true centrifugal method

Fig. 3 (bottom)—Chart showing centrifugal force (G) for various mold diameters and rotational speeds



the mold and into place before a falling temperature could increase the viscosity of the molten metal to an appreciable degree.

The high pouring temperature would insure minimum viscosity during this critical period.

For a thicker wall section, the operator would reduce the speed of rotation somewhat, and considerably reduce the pouring temperature to obtain a higher viscosity in the metal. The rate of pour would remain high since this is desirable in centrifugal casting with a few unusual exceptions.

Increasing the wall section further in this manner, the operator would eventually reach a point where there is an appreciable amount of cooling from the inside diameter toward the outside surface of the casting. This is contrary to the principles of true centrifugal casting and can result in a defective product.

In this case, additional directional control of cooling during pouring can be gained by making the openings at the ends of the mold as small as possible, as shown in Fig. 2, thereby restricting the circulation of air within the mold. After the metal has been poured, an exothermic pipe eliminator can be introduced. This will tend to keep the inner surface of the casting in a more fluid condition, permitting the inside to feed the balance of the casting and eliminate any center-line shrinkage which might otherwise occur.

Up to this point, the operator has been following the general rules of centrifugal casting which state that the rate of pouring should be kept as high as possible. However, by deviating from general practices, the operator can obtain bushings of even greater wall thicknesses.

To exceed the usual limits, he would pour in just enough metal at the usual high rate to cover the inner surface of the mold. In most instances this will be approximately half of the total metal required for the entire casting. Then, without breaking the stream, he would pour the remaining metal at the slowest possible rate.

At the reduced pouring rate, (*Please turn to page* 212)

FOUNDRY RESEARCH — at American

By EDWIN BREMER
Metallurgical Editor
THE FOUNDRY

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n Cast Iron Pipe Co

ALMOST from its inception in 1905 the American Cast Iron Pipe Co., Birmingham, has been research-minded—directing its efforts toward producing the best possible product at the lowest possible cost. For example, 40 years ago cast iron pressure pipe was cast vertically in large pits. The molds were rammed on one side of the pit, removed to large mold ovens where they were dried for 12 hours, and then brought back to the other side of the pit. The cores were set, the mold poured, the casting shaken out, and the flask taken to the other side of the pit for another cycle.

This method of operation involved numerous handlings of the flasks and only permitted one-shift operation. However, in 1909, after considerable study, the large mold drying ovens were eliminated, and the molds were dried individually by setting them vertically on drying stands over coal fires. Coke was soon substituted for the coal and by 1914 gas fires had replaced coke—the gas being manufactured from coke breeze in gas producers. Gas also was used for core drying. At the same time the pits were redesigned so that the operations of ramming, drying and casting were carried on continuously. As a result of those innovations two-shift operation was possible, and the capacity of the pit was doubled.

Previous to 1914 cast iron pipe was made in 12-ft lengths, but in that year the American Cast Iron Pipe Co. introduced for the first time in America the manufacture of 4 and 6-in. diameter pipe in 16-ft lengths. Two years later the practice was extended to include 8, 10 and 12-in. diameter cast iron pipe. Modern sand handling equipment and electric jolt rammers also were installed at that time.

Not content with the methods in vogue for producing pipe the company studied ways and means to improve them and reduce the time required. In 1912 it introduced in America what was termed the "skilley" core. The skilley was a mixture of clay, sand, paper, hair, molasses and cow manure, with the last named being the principal ingredient. In 1914 the mixture was changed to consist of paper pulp, clay, and fine sand. The mixture was made in thick soupy consistency and applied to the core arbors or barrels still hot from previous use. The core arbors were revolved and the mixture thrown on until a sufficient first coat thickness was built up. Sufficient heat remained in the core arbors to dry the first or skilley coat. The second or finish coat was applied immediately and oven dried. The principal advantage of skilley cores was the elimination of oven drying the first coat.

During World War I in 1918, when the price of coke rose to the unbelievable height of $16 a ton, the company decided that an economical move would be to use hot metal direct from the blast furnace, although this had been tried unsuccessfully by others some years previously. After study and experimental work it was found that a

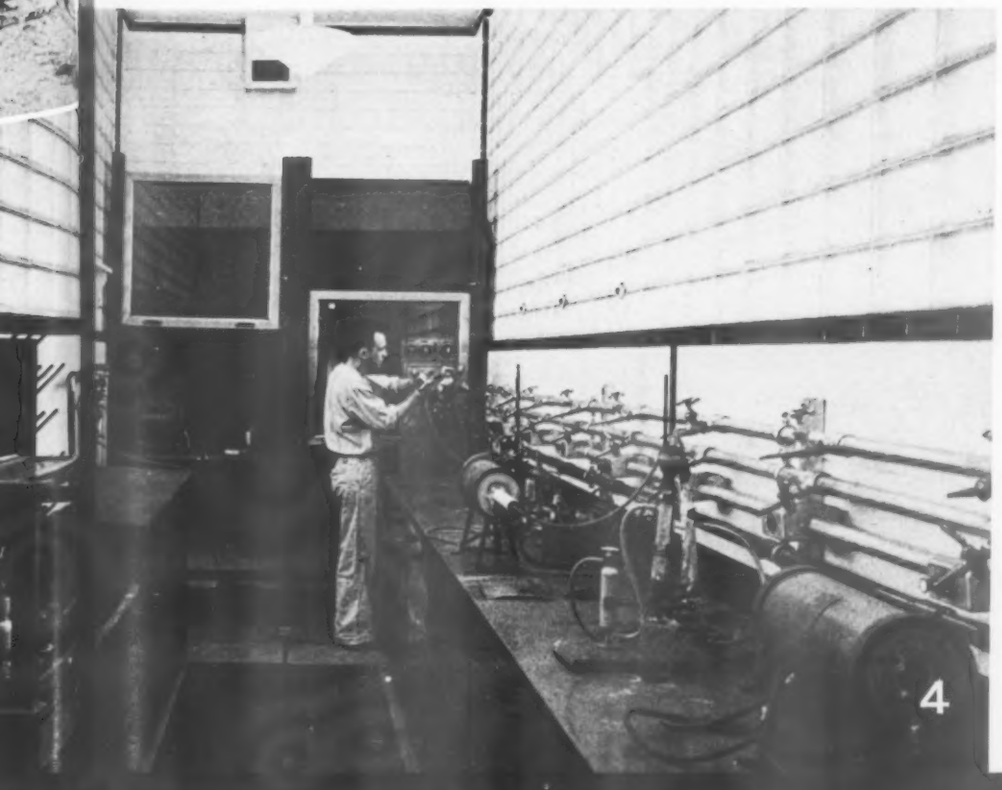

Fig. 1—Gamma ray inspection of steel castings, using a 200-mg radium capsule

Fig. 2—Destructive hydrostatic testing of 36-in. cast iron bell and spigot cross-braced in test ring

Fig. 3—Cast iron pipe ring crushing test in left foreground. Strip test in background and hardness test in right foreground

Fig. 4—Carbon room of chemical laboratory

mixture of direct blast furnace iron and cupola iron produced largely from scrap could be used satisfactorily. Consequently, four times a day direct blast furnace metal in 18-ton ladles was transported from a nearby blast furnace and cupola iron of suitable composition was added to provide an iron of the desired characteristics. Information on the analysis of the blast furnace metal was telephoned previous to its transportation, permitting adjustments in cupola operation to supply suitable iron for the addition. Later an electric furnace was installed for superheating and mixing the two irons, but subsequently the practice had to be abandoned because of the inability to obtain blast furnace iron of reasonably uniform analysis, and the small price spread between scrap and pig iron.

To facilitate its experimental and research foundry work the American Cast Iron Pipe Co. in 1919 purchased a completely equipped foundry with machine and pattern shops located a mile from the main plant, and until 1932 all such work was conducted there. In the latter year, the foundry was abandoned and the equipment moved to the parent plant.

During 1919 the company developed a mechanical joint as an alternate for the rigid flange joint. The joint was of stuffing-box design, using glands, bolts and woven

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asbestos gasket. Improvements and modifications of the joint in 1922 and again in 1928 permitted for the first time the application of cast iron pipe in the transmission of natural gas, crude oil and gasoline at high pressures. In 1934 the pipe joint was modified still further, resulting in a ball and socket type which permits a deflection of 15°.

Mechanical pipe joints of the type described require the use of bolts to hold them together. For that purpose it was the custom to employ steel bolts with various protective coatings, such as galvanizing or sherardizing. However, such bolts did not stand up as well as desired, particularly in comparison with cast iron pipe, and after some investigational work the firm in 1930 adopted a high strength cast iron bolt for application in the joints and similar use. The iron melted in a small cupola is a special mix, and is poured into metal molds mounted on an automatically operated unit to produce 1800 bolts per hour. The bolts are given a heat treatment which spheroidizes the graphite and results in a high strength product with a small but sufficient amount of elongation.

In 1922 the firm began experimental work on the lining of cast iron pipe with cement to prevent tuberculation or small organic growths on the pipe interior. The original process involved drawing a bullet-shaped or pointed die through the pipe after the application of cement to the walls, to obtain a smooth, uniform coating. In 1923 the process was improved by placing the pipe in a horizontal position on rollers and revolving it. Cement was introduced by a long trough, which not only distributed it but also acted as a trowel to smooth the surface and to insure the proper thickness of the coating. Further improvements in the practice of cement lining were made in 1938.

During 1922 the American Cast Iron Pipe Co. began the development of the process for centrifugally casting pipe in sand-lined molds. In 1923 a development unit for making 12-ft pipe in 4 and (*Please turn to page* 218)

Fig. 5—Measuring grain size of metal specimens with photomicrograph

Fig. 6—Inspecting steel rudder brake quadrants by use of magnetic particle type equipment

Fig. 7—Beam test of 3-in. cast iron pipe with load applied on threaded coupling

Fig. 8—Operating a spectrograph unit in making chemical analyses

Why

DESPITE widespread usage, materials specifications remain little understood tools. Numerous producers regard them as afflictions, and are frank to so state. Not a few consumers seem to feel that once specifications are applied the servicability and life of the product is assured. Some carry their enthusiasm so far as to demand detail and tests that have little bearing on the service properties sought. This adds to costs. Safety and assurance are not to be sought in many words and procedures. They are found in sound engineering understanding on the part of designers, metallurgists and test engineers.

Specifications and compliance thereto are means, not an end. The end or purpose of all engineering product development is maximum serviceability per dollar. Do not overlook the phrase *per dollar*. The economics of engineering have permitted the wide usage of its products, hence benefits to society. Serviceability is subject to many measuring sticks—performance, safety, long life, maintenance, renewability, appearance, and so on. Specifications used intelligently are means toward providing the greatest product service for the least expense.

A danger in specifications is an inclination to regard them as substitutes for the skill and integrity of the producer. The fact is that they are supplementary thereto. They define certain minimum characteristics, which may or may not be related to necessities of service. In so far as materials are concerned, they indicate the potentialities and uniformity thereof. The better class producer usually welcomes specifications. One among the various reasons is hardly altruistic—he recognizes that specifications force the lower class producer to at least a degree and proportion of what we may call "fair trade practices."

Reduce Prescription To Specification Terms

Let us assume that the designer has submitted his needs to the metallurgist, the factory superintendent, and the testing engineer, and that this group has co-operated in the choice or prescription of a material or of alternate material. Then comes the reduction of the prescription to specification terms, a job in which the metallurgist is particularly concerned.

The procurement agency presents the specification to the vendor. On acceptance by the latter it becomes an essential part of a contract. As such it is a feature of a legal instrument, and is binding in civil law. The legal implications may go beyond contract law. For example, specifications call for or should call for tests for compliance. Test compliance automatically becomes an essential in the instrument. Failure to test, falsity in reports and other malpractices may be subject to criminal action, as intent to defraud, wilful negligence in respect to injury to persons, etc.

The many specifications existing today have come into being because of acute needs for more definitions in respect to "quality" and uniformity. To prescribe "a good grade gray iron," or "a red brass alloy" or "a machinery steel" (as indeed was customary in not a few cases 20 years ago) means little. Definition in terms of measurement is essential. The real or final measurement is adequacy in service usage. Service tests and simulated service tests are desirable but in many instances are impractical in respect to both time and expense. Moreover, in case of materials specifications, the service of said materials is dependent upon their proper application. If the designer proceeds alone and chooses a material unsuitable for the purpose, the failure of the material is no true condemnation of the manufacturer thereof.

The author is a believer in service and simulated service tests wherever possible. The proof of the pudding is in the eating. Nevertheless, the majority of tests for specification compliance employ and will continue to employ less direct methods, such as chemical analyses, tests of certain mechanical properties of test specimens, etc. Such tests provide good measure of the type and of the potential characteristics of the materials. The number of kinds of specimen tests is increasing—to mention a few within the last decade: Impact tests, hardenability tests, grain size determination, carburizing tests, radiography, magnetic particle tests and the like. Both the older conventional tests and the newer ones are significant to the degree that findings therefrom can be correlated or translated into terms of service expectancy. Sound correlation is a very necessary thing. In many instances it is based on long experience and observation. In some instances it is based on careful research. It not infrequently happens that one test property is requested when another is pertinent, or a relationship is assumed which in fact does not exist. Incompatible properties sometimes are demanded simultaneously.

Much of the bad name hanging over gray iron a few years back arose from the insistent demand in the '20s and before for extreme machinability. Less informed founders furnished that characteristic at the expense of the strength and density of the metal.

In high temperature usage of steel good creep characteristics were asked for, and, in some casese, high impact values also. As the author and others pointed out years ago these two characteristics have appreciable incompatability. Other factors being equal, high impact is most readily attained by fine grain. In many cases fine grain tends toward lowering the creep strength. Sad to say, events of the last few years have demonstrated that undesired graphitization probabilities may be promoted by fine grain. In seeking so-called toughness (high impact and high ductility) both mech- (*Please turn to page* 210)

specifications?

Great advances have been made in developing specifications for materials but further improvement is desirable, the author points out. This paper was presented at an educational meeting of the Cincinnati Chapter, American Society for Metals

By JOHN W. BOLTON
Lunkenheimer Co.
Cincinnati

Excerpts from Standard Specifications for Steam or Valve Bronze Castings

(ASTM Designation: B 61-44)

Scope

1. These specifications cover alloy castings, the alloy being a composition of copper, tin, lead, and zinc, commonly used as a high-grade steam metal or valve bronze[3].

[3] The Rules for Construction of Unfired Pressure Vessels of the 1943 A.S.M.E. Boiler Construction Code (Par. U-20 (1)) require that bronze valves and steam metal of the composition covered by these specifications shall be limited to temperatures of 550 F.

Chemical Composition

4. The alloy shall conform to the following requirements as to chemical composition:

	Min.	Max.
Copper, per cent	86.0	90.0
Tin, per cent	5.5	6.5
Lead, per cent	1.0	2.0
Zinc, per cent	3.0	5.0
Nickel, per cent	...	1.0
Iron, per cent	...	0.25
Phosphorus, per cent	...	0.05

Tensile Properties

6. The alloy shall conform to the following requirements as to tensile properties:

Tensile strength, min., psi	34,000
Yield strength, [a]min., psi	16,000
Elongation in 2 in., min., per cent	22

Certification

13. In the case of a product manufactured in advance and supplied for sale from stock by the manufacturer, jobber, or other dealer, the product may upon request of the purchaser be certified by the manufacturer as conforming to these specifications subject to the following procedure: Not less than two tension tests, from different heats, and not less than one chemical analysis shall be made by the manufacturer from each day's melt. Records of the tension test results and chemical analysis shall be systematically made and maintained and shall be the basis for certification. In lieu of the manufacturer's certification and upon written request by the purchaser, these records may be examined by the purchaser or his accredited representative upon the manufacturer's premises.

Excerpts from Standard Specifications for Gray Iron Castings

(ASTM Designation: A 48-44)

Scope

1. These specifications cover general gray iron castings not covered by other existing specifications of the American Society for Testing Materials and apply to gray iron castings where strength is a consideration. It is a purpose of these specifications to classify cast irons in respect to tensile strength.

Tensile Strength Classification

2. Gray iron castings conforming to these specifications shall be known and listed by classes (Notes 1, 2, and 3), according to the following minimum requirements as to tensile strengths of test bars:

Class	Tensile Strength, min., psi.
No. 20	20,000
No. 25	25,000
No. 30	30,000
No. 35	35,000
No. 40	40,000
No. 50	50,000
No. 60	60,000

Transverse Test

3. (a) Transverse or flexure tests shall be optional. When specified, the breaking loads prescribed in Table I shall apply.

(b) By agreement between the manufacturer and the purchaser, deflection values in the transverse or flexure test may be specified (Note 4).

(c) The transverse or flexure breaking loads prescribed in Table I are based on actual averages of transverse test loads for each class of casting. It is not implied by these specifications that the ratio of tensile strength to transverse load is constant. By agreement between the manufacturer and the purchaser, tensile strength and transverse tests may be made and a range of transverse values determined. These values will then supersede the values prescribed in Table I.

(d) When an iron is specified by class (No. 20, No. 25, etc.) and the transverse or flexure test bar fails to meet the load requirements prescribed in Table I, then the manufacturer shall have the right to have tested a tension test specimen machined from a broken end of the transverse test bar. If this tension specimen conforms to the requirements of the specified class, as given in Section 2, the class requirement shall be considered as having been met, irrespective of the transverse or flexure breaking load.

Correlation of Test Bar and Casting

5. (a) The manufacturer and the purchaser shall agree upon the controlling section of the casting. Then the corresponding test bar shall be used as follows:

Controlling Section of Casting, in	Test Bar	Nominal Diameter of Test Bar as Cast, in.
0.50 and under	A	0.875
0.51 to 1.00	B	1.20
1.01 to 2.00	C	2.00
Over 2.00	Test bar C may be used or a larger test bar may be used by agreement between the manufacturer and the purchaser.	

(b) The correlation in Paragraph (a) is only approximate and may need modification for complicated castings. The test bar size for a given casting may then be determined by agreement between the manufacturer and the purchaser.

(c) When the controlling section is very heavy in comparison to other sections of the casting and if maximum strength is sought in the controlling action, it is possible that chilled spots may be found in the light sections. In such cases it may be necessary to (1) use a lower strength class for the controlling section, or (2) modify the design to provide more section uniformity.

MECHANIZED CASTING OF *Soil pipe and*

By PAT DWYER
Engineering Editor
THE FOUNDRY

fittings

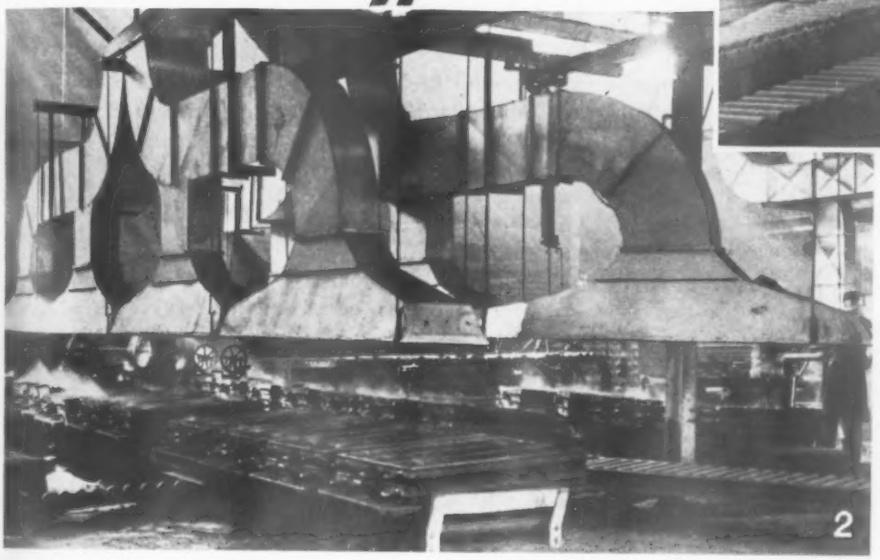


Fig. 1—Iron from the cupolas is tapped into a stationary covered and insulated mixing ladle which supplies the constant succession, of pouring ladles

Fig. 2—Hoods over the pouring stations are connected to an exhaust system

Fig. 3—Boiler sections cored on conveyor

This is the second and concluding article describing certain foundry practices of Warden-King Ltd., subsidiary of Crane Co. Ltd., Montreal, Que. The first article appeared in the June issue

EXTENSIVE changes in methods of production at the plant of Warden-King Ltd., subsidiary of Crane Co., Ltd., Montreal, and a further expansion program in contemplation in the immediate future, were brought about to a considerable extent by conditions in the industrial field, conditions that by no means are confined exclusively to the foundry. The first main factor in any manufacturing problem is the desire to improve the quality of the product and reduce the cost of operation. Probably the second most important factor is the necessity, under present emergency conditions, of operating with a reduced crew of willing but untrained workmen. Under skilled and scientific supervision and with mechanical equipment functioning rapidly and accurately, the task of training green help is reduced to a minimum. Personnel in the Warden-King plant is approximately 60 per cent French Canadian. The remainder includes representatives of many nations. Up to the present no Negroes and no women have been attached to the pay roll.

A general description of the molding and coremaking equipment and methods was presented in the June issue of THE FOUNDRY. The castings are cleaned in tumbling barrels and in blast abrasive chambers and then are taken into an adjoining chamber for any necessary chipping and grinding. Amount of this work is negligible on castings that come from perfect molds—no fins along the joint lines or around the core points. Gates are designed to break off sharp and clean. The boiler sections and radiators

are given a water pressure test before they enter the machine shop.

In the machine shop, the openings in the boiler sections are bored for the reception of the nipples which connect one section with another. The front section of any assembly is fitted with doors, grates and other items, depending on whether the furnace is to be fired with coal, coke, gas or oil. Methods and equipment for machining and assembling the constant flood of the boiler and radiator sections pouring in from the foundry present many interesting features but lie outside the scope of the present description, confined to the foundry.

After the soil pipe straight lengths and fittings are cleaned they are trucked across a driveway to a building in which they are coated with pipe varnish or coal tar pitch specified for all underground pipe. The castings first are dipped in a steam-heated water bath where they are raised to a temperature of 150 F. Then they are lifted out of the water bath and lowered into a vat filled with liquid pipe varnish or coal tar pitch maintained at the same temperature. They are allowed to remain in the bath for 2 minutes and then are lifted and held in suspension until all the surplus material has drained off. A special clip suspended from the crane is employed for dipping a number of straight lengths at one time. Miscellaneous fittings are loaded in steel baskets which are approximately 40 in. in diameter and made up of an upper and lower ring connected by a number of 1-in. diameter steel rods spaced about 6 in. apart. Rods forming the bottom are somewhat closer together. Following this treatment the pipes are ready for shipment.

The foregoing description is presented a little more stiffly and formally in the Standard Specifications proposed by the American Society for Testing Materials and adopted universally by pipe makers: (a) When pipe or fittings are to be coated, coal tar pitch shall be used, which shall contain sufficient oil to make a smooth coating. The pitch shall be tough and tenacious when cold and not brittle nor having any tendency to scale. (b) The varnish shall be heated to about 200 F, and shall remain at this temperature during the time the casting is immersed. (c) Each casting shall be heated to a uniform temperature of about 150 F immediately before it is dipped and shall possess this temperature at the time it is put in the bath. (d) Each casting shall remain in the bath at least 2 minutes. (e) Fresh pitch and oil shall be added when necessary to keep the mixture of the proper consistency and the bath shall be emptied of its contents and refilled with fresh pitch whenever the accumulation of sand or carbonaceous matter renders this desirable, as can be seen by the solids adhering to the under side or lower ends of the castings. (f) After being coated, the pipe and fittings shall be carefully drained of the surplus varnish.

Problem of melting and distributing approximately 150 tons of metal every day has been simplified to some extent by dividing the work between a day shift and night shift. Practical impossibility of recruiting a full night crew has resulted in a program where a heat of 120 tons is melted in the day and the remainder, approximately 30 tons, is melted at night. Three cupolas are available for melting the iron, 45, 54 and 66 in., respectively, inside the lining and *(Please turn to page 214)*

Fig. 4—Core sand rapidly is removed from boiler sections mounted on a steeply pitched vibrating device

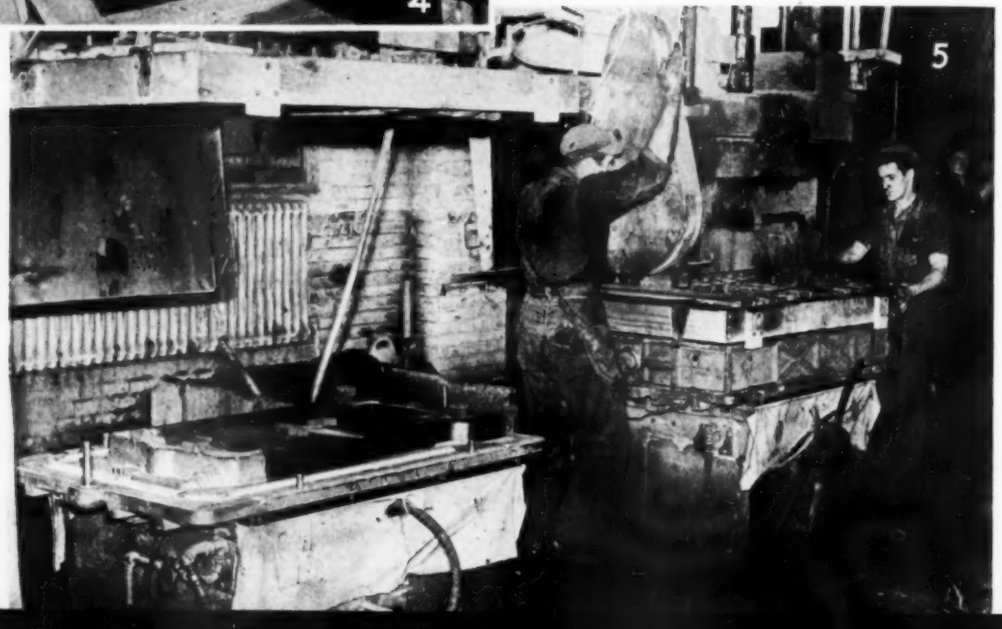


Fig. 5—Cope and drag pattern parts for boiler sections are mounted on adjoining machines

Developments in the malleable iron industry

By CARL F. JOSEPH
Saginaw Malleable Iron Division
General Motors Corp., Saginaw, Mich.

This review of recent developments in malleable iron foundry practice comprises a paper presented at the regional foundry conference sponsored by the four Michigan chapters of the AFA and the engineering department of Michigan State College

RECENTLY the president of a malleable iron company informed me that he had applied for a loan at the local bank. The conversation centered around the malleable iron industry. The banker wanted to know whether the industry was progressive and what improvement had been made in the past to justify classifying malleable foundries as a live industry. He remarked "We are not interested in putting our money into a dying industry."

What really determines whether an industry is dying or is up and coming, are the new developments that are coming forward in that industry. Contrary to what was true to a considerable extent in the years preceding the war, the malleable casting industry really is coming through in wonderful shape and making some real progress.

There is no need to emphasize any specific branch of the industry. In reporting any new developments, the newness is not necessarily something that has been used only during the past year. Touching some of the high spots will indicate the trend of the industry along certain lines.

By far the larger percentage of malleable iron melting is done in the air furnace. The trend in recent years has been toward duplexing, using the cupola as the primary means of melting and the air furnace or electric furnace as a holding unit. This offers many advantages and provides a constant supply of uniform, hot metal at a low cost.

Duplexing probably is the best way to obtain greater output with a minimum increase in personnel. It is the first step in the mechanization of a plant and stimulates and aids improvement in good housekeeping.

Continuous tapping has in many cases replaced intermittent tapping and produces a lower carbon, hotter iron.

Other cupola controls gaining favor are hot blast and humidity control. Either or both constitute a wonderful addition to uniform cupola melting and easily can be justified from both a control and cost angle.

Numerous plants are experimenting with atmosphere control of cupolas and air furnaces. There is no question that once this control has been standardized it will lead to better operation. This is also true of temperature control of the iron, as melted, and poured into the mold.

A proprietary material which has been used in a few plants to compensate for the poor purchased scrap during the past few years is silicon carbide and acts as a deoxidizer. Plants that use it claim the following advantages: 1. Less tendency for internal shrinkage. 2. Elimination of shrinkage cracks and hot tears close to or at point where risers feed castings. 3. Higher temperature of metal at cupola spout. 4. Slight improvement in fluidity. 5. Approximately 10 per cent coke saving. The only disadvantage: Slag is slightly more viscous, therefore the cupola is just a little more difficult to operate The amount used is 6 2/3 lb per 1000-lb cupola charge.

As we moved further into the peacetime era, it became clearly evident that we must utilize plant improvements that reduce heavy work and improve working conditions. One of the greatest improvements to reduce fatigue of the worker is the handling and closing of molds, especially of the larger and heavier type. Equipment installed in our foundry for mechanical handling of molds has resulted in allowing older men to work on molding machines. It has lengthened the life period men can work on this job by 10 years and has made the work much easier. In double match molding the molder makes both cope and drag on the same machine and increases his productivity some 50 per cent.

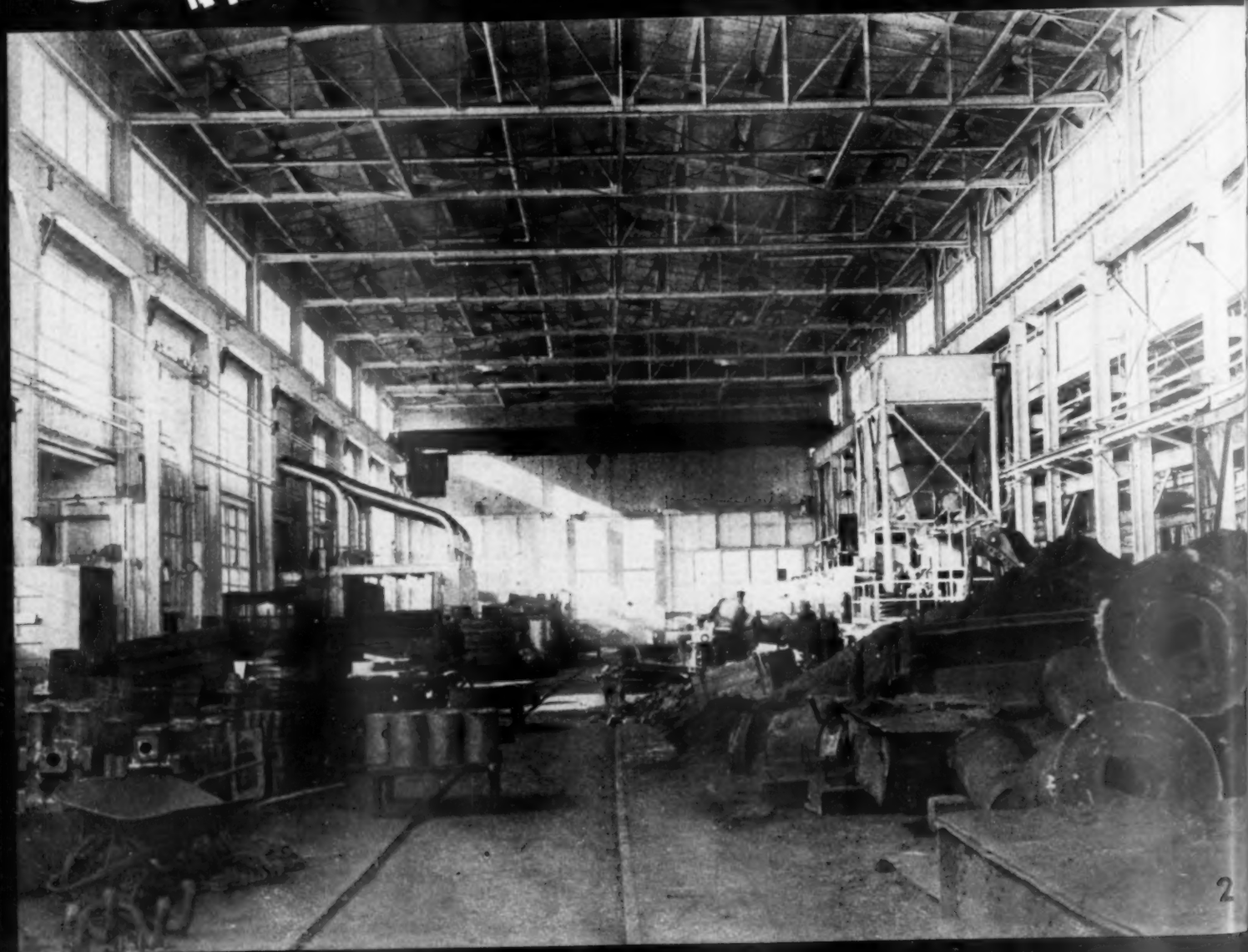
Composite molding is another fairly recent development. Two or more jobs are grouped on a pattern plate to utilize to a greater extent all available mold area. If necessary at any time, an entire quarter of the pattern can be removed and replaced with another job.

Use of mechanical mold handling, together with composite molding, offers possibilities of larger flasks and therefore more casting weight per mold. Castings in a large composite mold 3 x 6 ft, used in making army truck parts and described and illustrated in THE FOUNDRY January and February, 1945, took around 900 lb of iron.

In another new molding development, the so-called over and under molding, two castings are produced with a core between them. Placing of one core gives twice the casting weight per mold, and is justified in many cases, especially when one side of the casting is flat.

A new method of gating cer- (*Please turn to page* 217)

WHITE PAINT *aids good*



By JAMES L. YATES
Consulting Engineer
National Engineering Co.
Chicago

d housekeeping

TO THE average person, a foundry is a dark, dank, poorly lighted, smoke-filled place where dirty men sweat and swelter, and breathe obnoxious fumes in making castings.

As is true of other phases of the foundry industry, lack of knowledge of actual working conditions in modern foundries is appalling and is one of the obstacles blocking the flow of much required new blood to a rather lucrative and highly interesting industry in so far as the general workman is concerned.

Years ago, and in some isolated areas today, some foundries were dank, dark and dirty. But in the light of greatly increased foundry labor costs in an industry where direct labor represents such a large percentage of the cost of the product, much has been and is being done to mechanize former laborious operations and to improve foundry hygiene and dust control.

Dust Can Be Controlled

The very nature of foundry work, particularly iron foundry work, is such as continuously generates fine particles of matter generally considered as dust and, unless it is properly controlled, it floats in the air, settles on building walls, builds up on steel work, covers equipment and in short makes itself a general nuisance. However, with modern equipment it is possible to control this dust at the point where it originates and to collect it and prepare it for disposal in a form that will entirely correct this problem.

The best of foundry housekeeping goes unappreciated and unnoticed unless dust is controlled. Furthermore, in the more progressive states, adequate dust control is mandatory by law and it is reasonable to assume that these laws on foundry hygiene will be enforced.

Once adequate dust control is provided, good housekeeping shows up in increased production and improved worker spirit. Cleaner foundry atmospheres and better housekeeping point the way to further improvements, all of which pay dividends and some of which provoke consternation on the part of old timers but are enthusiastically accepted when carried through.

Such a one is white paint for foundry walls and interior steel work.

Based on an experiment with carbide sludge as a paint on a brick wall of one of its bench molding departments, one modern foundry of the job shop type at Worthington's Buffalo Works has just completed painting the interior of its foundry and cleaning room, white with a gray dado.

All overhead cranes are painted yellow with black safety signs, all jib cranes aluminum with yellow stripes and all equipment and sand bins aluminum. As evidenced by the accompanying photos the effect is startling and truly adds to making the foundry a good place to work.

Our first experience with white walls in a foundry was the use of carbide sludge mixed to the following formula, which is said to be recommended by insurance companies because of its fire retarding qualities.

1. Mix about 120 lb of carbide residue with water to a creamy consistency.
2. Mix 2½ lb of rye flour thoroughly with ½-gal of cold water, and then thin with 2 gal of boiling water.
3. Dissolve 2½ lb of common salt in 2½ gal of hot water.

Fig. 1—View of the cleaning room on an average day prior to painting. Crane door is open

Fig. 2—View of the same area as in Fig. 1 after painting. All doors and windows are closed

Fig. 3—The wash room helps to make foundry workers the best dressed men leaving this plant

4. Mix (2) and (3), then add (1) and stir until well mixed.

This mixture will weigh approximately 12 lb per gallon and will cover approximately 225 sq ft on wood, 180 sq ft on brick or 270 sq ft on plaster.

The wall selected was in one of the darker spots in the foundry, the only direct sunlight in this area coming from 4-ft high windows 10 ft above the floor level. Light reflection was greatly improved when the "paint" was applied and the light level in daylight was raised appreciably. Light reflection at night was improved and in general the painting was considered well worth while.

But how would it stay white? That particular wall was "painted" white in 1939, before we completed our dust control program, and in 1945, when we started to paint the entire foundry interior, it showed greater light reflection than freshly painted aluminum surfaces in the same general area.

Painting the walls, steel work, ceilings and equipment in a foundry having a floor area of approximately 100,000 sq ft and walls with a maximum inside height of roughly 48 ft involved a number of problems which are worthy of consideration by anyone contemplating a similar undertaking.

First is the matter of the type of paint to be used. In this case, the paint had to be suitable for brick, plaster, wood, structural steel, haydite slabs, corrugated asbestos siding and flat sheet and corrugated steel siding. It had to cover well and be such as could be sprayed or brushed. It had to be washable and we intend to hose it down as occasion requires.

After trying a great many samples in selected spots, and taking into consideration our experience in painted machine and other shops, we decided on a super-hiding-egg-shell-white in preference to the flat whites which usually have much more porous finishes and tend to hold a greater percentage of dust and also in preference to the glossy paints which tend to highlight everything and cause an annoying degree of reflection of sun or light rays.

The paint selected offered a smooth surface, one that would hold a minimum of dust; maximum light reflection without glare; ability to be wiped down dry without smudging and ease of washing down when necessary. The magnitude of the job was such that it was beyond our own maintenance painting crew and equipment and was therefore let out to a contractor experienced in painting industrial buildings.

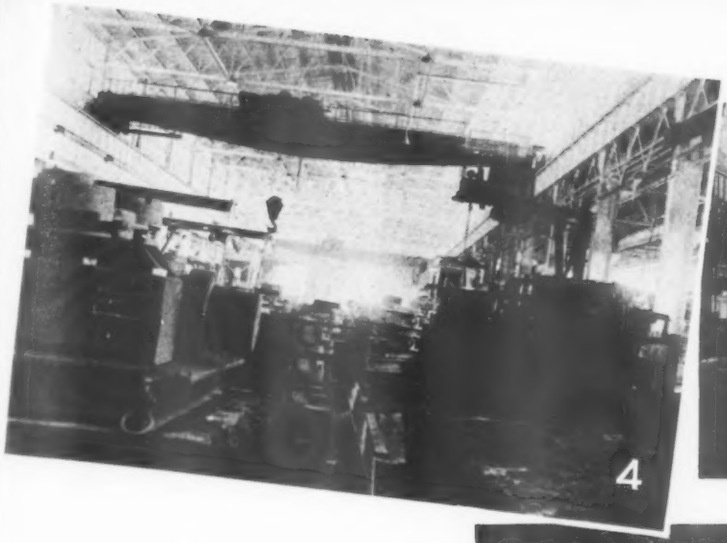
The job specification called for blowing down all loose foreign matter from walls, ceiling and steel work and wire brushing when necessary. The work was done at night after the regular foundry operations were completed. Wherever possible, the work of spray painting the ceiling and upper steel work was done from the overhead traveling cranes.

Where staging was necessary under the roof peak, the work was done a section at a time, the first coat being applied one night and the second coat the next, so as to minimize staging movement. Work on window sash and skylights and work adjacent to windows was done by brush in order to prevent spraying paint on the glass.

After the first week of painting, it was found imperative to use cover cloths on the overhead cranes to keep sprayed paint from settling back on trolley wires and trolley collectors, on exposed armatures and commutators; otherwise, considerable work would have been required to make the cranes operative after being used as a painter's stage. The same was found true of conveying and sand mixing equipment in the area being painted.

While some slight amount of paint globules were carried down and landed on finished molds and cores, they did not cause any difficulty as regards good casting production. Some difficulty was experienced with newly painted sections turning brown and investigation indicated that these portions, mostly steel work, had been previously painted with asphalt base paint and the asphalt was simply burning through. The remedy was to spray these portions with a coat of aluminum paint and then cover with the white.

(*Please turn to page* 215)



Figs. 4 and 5—Showing how white paint assists in bringing the light level down between large molds

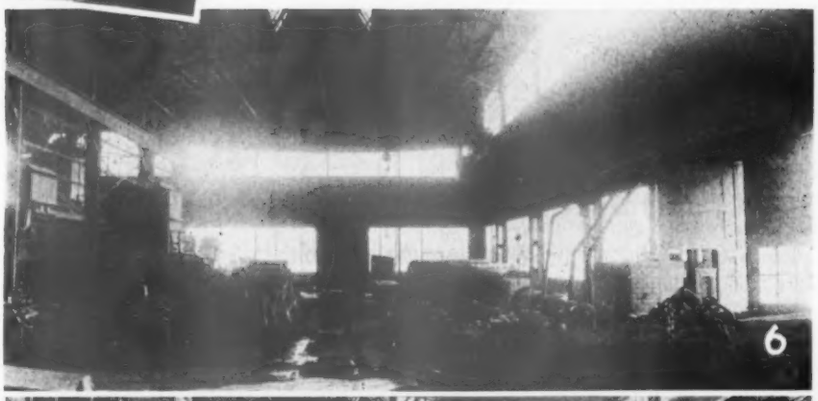


Fig. 6—Another view of the cleaning room on a bright day before painting. Some of the side doors are open

Fig. 7—The same area as in Fig. 6 after white paint had been applied

Fig. 8—General appearance of one area of the foundry before painting

Fig. 9—Showing the improved lighting after painting the area pictured in the preceding figure

A·F·A

Extent of the technical program for the AFA Golden Jubilee Foundry Congress held recently in Cleveland prevented publication of detailed reports on all sessions in the June issue. Concluding accounts of other sessions are presented here

ONE of the most interesting and instructive technical sessions held during the recent 50th Anniversary convention of the American Foundrymen's Association in Cleveland was that sponsored by the Time Study and Job Evaluation Committee at which a jammed meeting hall audience heard Phil Carroll Jr., consulting time study engineer, Maplewood, N. J., review what he believes management should know about time study work. He was introduced by Robert J. Fisher, Falk Corp., Milwaukee, and F. E. Wartgow of the AFA staff served as co-chairman.

Citing the fact that because of inadequate time study talent, managements often reject a wage incentive system in the belief it costs too much to figure jobs, he said that in the long run practically no job is too expensive to figure if the resulting benefits in productivity and improved worker morale are kept in mind. He added that there is a distinct need for a higher type of time study expert—men who have sufficient conviction in their jobs to bear up under "tough" situations. Hence it becomes necessary to pay special attention to training men for job evaluation work, and such men are often found to be the best type for future promotion to managerial posts because of their intimate knowledge of the specific jobs in a plant. Further, it is a wise policy to train union stewards in time study work, so that the development of standards can be understood by unions.

Standards Should Vary with Conditions

As far as job standards are concerned, Mr. Carroll emphasized that standards should be changed each and every time a change is effected in methods or equipment, and not as is so often the case when there is only a major change introduced. Strict observance of this policy he held to be vital.

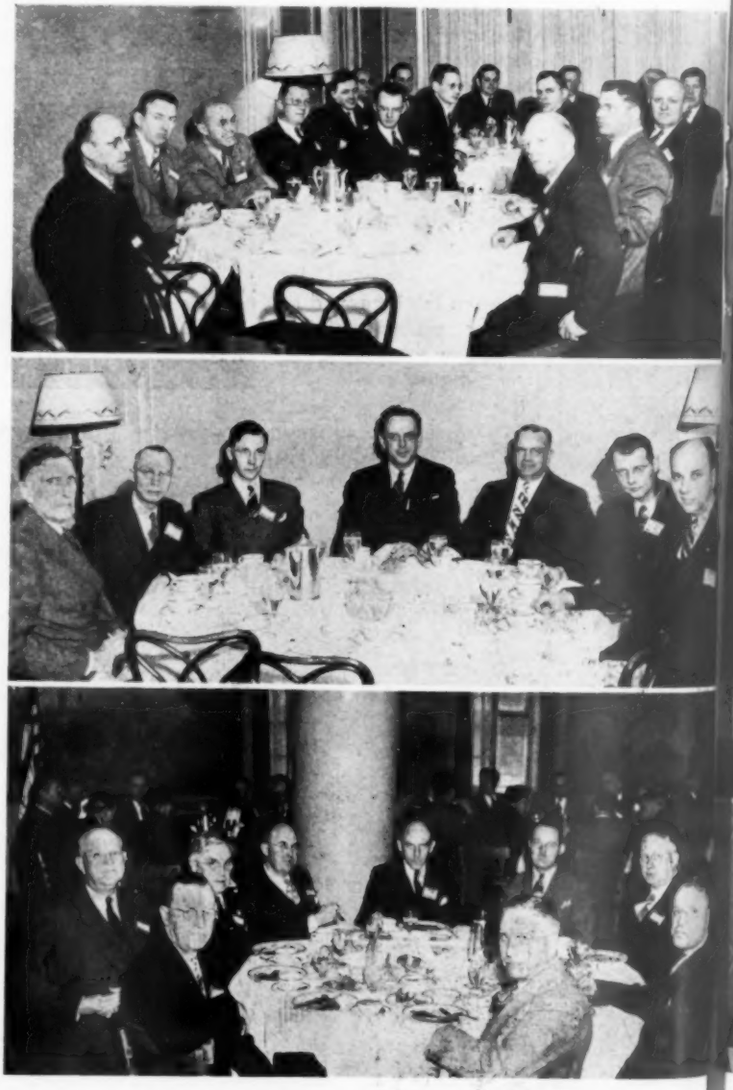
Good incentive plans are profitable for three principal reasons: 1. They increase take-home pay; 2. They reduce costs by increasing productivity; and 3. They provide better labor and overhead absorption. Their purpose may be regarded as twofold—to provide adequate reward for workers, and to sustain worker interest.

In the development of incentive systems, Mr. Carroll strongly favors the use of work units or the "time" basis rather than the hitherto most generally used system of piecework or the "dollars and cents" basis.

Questioned as to the merits of employee suggestion plans, he said that to be effective they must embody three things: Adequate reward for the proponent; immediate activation, and ample publicity.

Replies to a questionnaire on foundry time study practices, as compiled by the AFA, were presented for brief discussion as one feature of the second session devoted to job evaluation and time study. Later, as soon as opportunity affords, a complete analysis of the replies will be made.

The program was devoted essentially to spot questions and answers, with five experts at the head table respond-



Heavy attendance marked the numerous technical sessions and luncheon and dinner meetings sponsored by the various AFA divisions during the recent convention. A view of registration headquarters at Cleveland Public Auditorium is shown at the far right

Congress Sessions

Recount foundry developments

Some of the speakers, chairmen and other participants in the approximately 150 technical sessions and committee meetings held during Foundry Week at Cleveland. Lively interest in recent foundry developments was evidenced at these gatherings

ing to questions from the floor. Approximately 120 were present, with discussion lively and covering individual problems of companies represented as well as those of broad overall character. Also, points in the questionnaire came in for special attention.

Robert J. Fisher, Falk Corp., Milwaukee, presided and Frank E. Wartgow, American Foundrymen's Association, Chicago, served as co-chairman, with both men also serving on the panel which answered questions from the floor. The others were Phil Carroll Jr., Maplewood, N. J.; J. C. Lewis, Associated Engineers Inc., Fort Wayne, Ind., and Jeff Alan Westover, Westover Engineers, Milwaukee.

Response to the AFA questionnaire revealed that 252 out of 350 who replied used an incentive form of wage payment; also that of 354 replying as to how their rates were set, 114 used standard data (55 using this method only), 169 direct time study (80 this method only), and 71 other method (44 this method only). A hand survey of those at the meeting indicated that out of 120 or so present eight used standard data and about twice as many used direct time study.

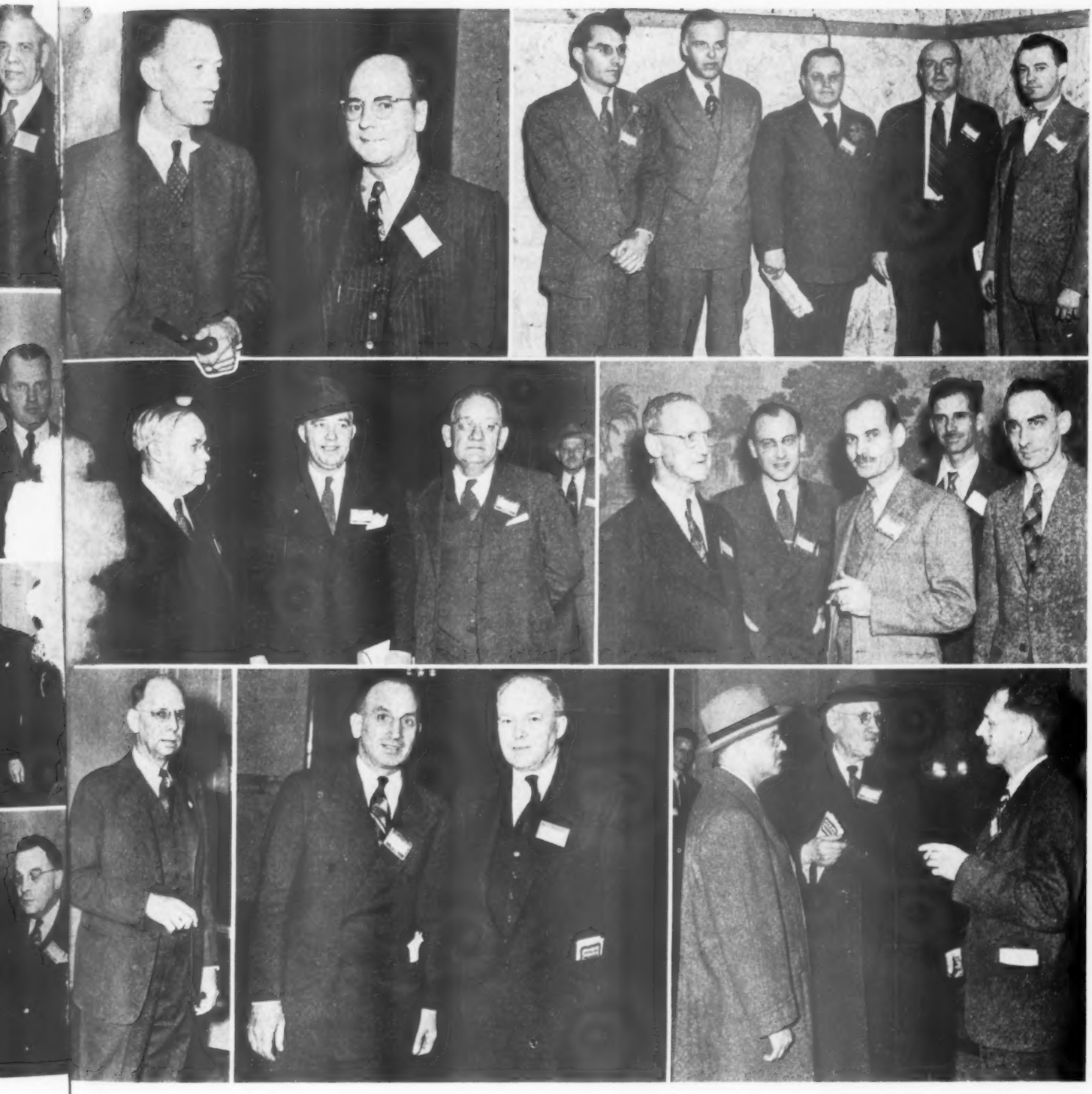
One question raised in the questionnaire asked how many supervisors receive training in time study work, and of the 292 who replied, only 56 answered in the affirmative. The experts without exception believed that this indicated lack of interest in training supervisors in time study work is a grave mistake. One of the biggest jobs of a company in setting up a time study is to sell the supervisors—"they can make or break it," one consultant declared. It is important that the supervisors know what it is all about; "sell them and most of the trouble is solved," he said. However, the expert stressed that time study work "is not a substitute for good supervision; it is just another tool."

° ° °

APPRENTICE training problems provided the subject for discussion at two sessions sponsored by the Apprentice Training Committee. The first of these meetings was under the joint chairmanship of Frank Cech, Cleveland Trade School; and W. J. Hebard, Continental Foundry & Machine Co., Chicago. In presenting a paper on "Standard Apprentice Training," Carl F. Haertel, Falk Corp., Milwaukee, pointed out that many systems have been tried, but up to the present, no one method has been definitely determined as the best.

Since the speaker had a definite part in the development and later administration of the system in use by the Falk Corp., he devoted the greater part of his address to that phase of the subject. He favored the system of indenturing apprentices and in following a definite program of a combination of shop and school work, for a total period of four years, or 8030 hours. Wages of apprentices naturally fluctuated in line with other fluctuations in the locality, but an increase is granted with each change of occupation which generally approximates a six-month period. At the conclusion of the apprenticeship period each young journeyman receives a bonus of $100. He explained that the system had been developed and had been found satisfactory in a general jobbing steel foundry, but obviously would require some trimming and pruning if installed in other types of foundries.

W. J. Hebard in discussing an accelerated training pro-



gram, referred to the fact that the recent war introduced many new methods in training new foundry employees. Emergency conditions left no time for leisurely experiment. Every available employee had to be pressed into service and trained as quickly as possible. While the emergency no longer exists, it is inevitable that certain practices in whole or in part will continue.

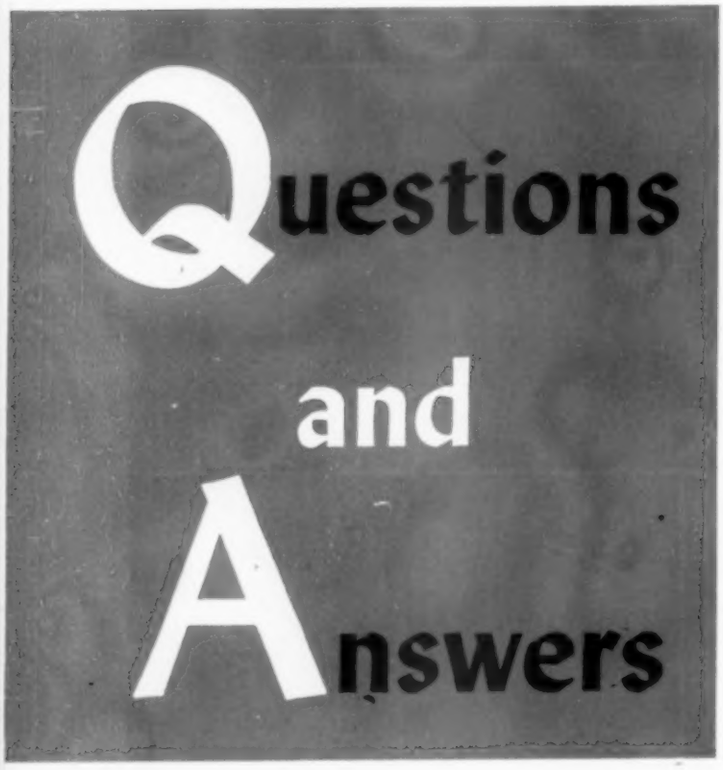
In his usual forceful manner, M. J. Gregory declared that the foundry industry had changed to a considerable extent in recent years, and that the old flat, all-on-a-level grading and training of apprentices is no longer the best method, particularly in the so-called production shops. He favored the selection of suitable candidates, giving them every opportunity to develop and exercise mental and physical qualifications. W. M. Owen, Caterpillar Tractor Co., Peoria, Ill. described a method for veteran training. A general summary of the situation was presented by Clement J. Freund, University of Detroit.

Concluding phases of discussions on apprentice training comprised a dinner followed by a technical session. Carl W. Wade, Caterpillar Tractor Co., Peoria, Ill., and John Grennan, University of Michi- (*Please turn to page* 140)

Dimensional Tolerances Vary

Q.—We would appreciate information on whether or not a periodical or book exists which lists the tolerances that can be held on sand castings of various materials such as cast iron, malleable iron, brasses and bronzes. So far we have been unable to locate any such figures which are accepted generally in the industry.

A.—So far as we are aware there are no generally accepted dimensional tolerances which will apply in all foundries since numerous factors are involved in castings production and practice varies from shop to shop. Hence, tolerances usually are determined by agreement between



castings producer and buyer. With reference to dimensions of castings the *Cast Metals Handbook,* published by the American Foundrymen's Association, has the following to say:

"To produce castings *true to the drawing* it is necessary to make the pattern of such dimensions and shape as to compensate for the natural shrinkage of the metal, the effects of mold resistance, and other partly controllable phenomena.

"The allowances to be made on the pattern, to produce the casting of proper size and shape, depend partly on casting design, mold design, shrinkage and contraction characteristics of the metal involved, and many other factors. These factors cannot be computed mathematically (i.e. from contraction per in. and like data) and a process of trial and error must be undertaken so that pattern dimensions can be adjusted to give castings of dimensions required by drawings."

Close co-operation between designer and foundryman will permit closer tolerances than when that is not the case. Long production run castings can be made closer to size since adjustment of patterns and molding practice by trial and error at the beginning of the run will bring the dimensions within the desired range. Size and intricacy also play an important part in dimensional accuracy, and it is easier to get close tolerance on a small, simple casting than one that is intricate, or one that is large.

Making Sash Weight Castings

Q.—What can you tell us about the manufacture of sash weights?

A.—Sash weights are made according to a variety of methods, depending principally on the volume of business. In comparatively small quantities they are made from solid patterns sunk half way in a follow board. The sand is rammed by hand. Where a squeeze or jolt machine is available the patterns are mounted on matchplates, either with half patterns on one side, or with half patterns on both sides of the plate. Wood patterns are fairly satisfactory, but metal patterns are preferable for long and hard usage.

In some plants the patterns are mounted vertically on jolt machines. The metal patterns are stripped through a suitable plate and the eye in each is formed by a small dry sand core. This method is confined to the short lengths. Length of the casting is determined by the distance the pattern is allowed to project above the plate. In another method practiced extensively in large production shops, two rows of steel pipe patterns are rammed alternately above each other horizontally in a deep flask and are pulled out through openings in the end of the flask. The open ends are stopped by small cores or chills to form the eyes. The metal enters the terraced rows of molds at the opposite end.

Polishing Aluminum Utensils

Q.—We are engaged in the manufacture of aluminum kitchen utensils, and are having difficulty in obtaining a mirror finish on the interior. Can you give us information on the materials used in polishing or something that can be done to the aluminum which will result in a clean casting? We are using the 5 Si-95 Al alloy melted in an oil-fired furnace.

A.—Your remarks about a clean casting without any specific detail bring up the question of whether your trouble lies in the polishing operations or in the condition of the alloy with which you are working. If you mean that you are unable to obtain the desired finish because the polished surface shows numerous fine pinholes or pits, the trouble comes from gassy metal, and that condition will have to be corrected. See that the burners on the furnace are adjusted so that complete combustion occurs. Do not allow the metal to stew in the furnace at high temperature, and raise the temperature only sufficiently above the pouring temperature to permit the metal to be handled to the mold side. Degas the alloy with nitrogen, chlorine, or one of the numerous solid proprietary degassing fluxes available.

In polishing, four steps usually are followed for sand castings, namely roughing, oiling, buffing and coloring. The roughing operation is accomplished with glued or cemented muslin or canvas wheels. Periphery of the wheel is coated with glue, then rolled in the abrasive grit, and

dried in a warm place. Abrasive may range from 60 to 100 grain or grit and may be emery or aluminum oxide. Grain sizes to be employed will depend on initial roughness of the casting surface, and several grain sizes from coarsest to finest may be required to obtain the desired results. Wheel speed should be about 6000 surface fpm.

Oiling is a refinement of roughing and is performed with felt or sheepskin wheels to which abrasive is applied as in the case of the muslin or canvas wheels. Grain size of the abrasive may range from 100 to 220. If the previous operation included a 100-grit wheel, the oiling may require only 220-grit. However, if the roughing was completed with a coarser wheel, the oiling probably will require a 100-grit wheel followed by the 220-grit. As the name oiling indicates, a lubricant is employed by applying it to the face of the wheel, and it may be tallow, oil, beeswax, or tallow composition.

Buffing is the next operation and is accomplished with sewed muslin buffing wheels. Tripoli powder mixed with various mixtures of tallow, beeswax, stearic acid, etc., and available in stick or block form is the abrasive or polishing material. It is applied to the face of the wheel by pressing the tripoli stick against it. Wheel speeds are higher than in previous operations and range from 7000 to 7500 surface fpm.

Final operation is coloring, which develops the mirror finish you mention. This is performed on loose unsewed or flannel disks mounted between washers to form a wheel. Peripheral speed is somewhat higher than for buffing, around 7500 to 8000 fpm. Abrasive may be lime or soft silica in stick form, which is applied to the face of the wheel. Since lime tends to draw moisture and form a product which will attack the metal surface, many operators prefer silica.

Increase Cupola Melting Rate

Q.—We would like to know if and how our cupola can be made to melt faster. It is lined to 33 in.; coke bed is 45 in. above tuyeres; air pressure is 3 oz; air volume being used (full capacity) is 1700 cfm. First iron charge is 1200 lb and intermediate charges of coke and iron are 85 and 700 lb respectively. Iron begins to gather in the well 20 minutes after the fan goes on. Melting rate at present is 1.8 tons per hr. Tuyere area is 112 sq.in. using four pairs of tuyeres.

A.—Your cupola lined to 33 in. should melt at least 4 tons per hr or somewhat over twice the figure you give, provided the amount of air supplied is high enough to maintain that rate, or about 2000 cfm. However, even with the figure of 1700 cfm which you mention, the melting rate should be around 3.5 tons per hr except for the fact that the pressure is only 3 oz, and seems extraordinarily low. Possibly your pressure gage or volume gage, or both, do not register properly.

While the tuyere area seems slightly below that usually recommended—114 sq in. as compared with 142 sq in.—we do not believe it should affect the melting rate to any appreciable degree. Your description indicates that you are using two rows of tuyeres. By using only one row you could save enough bed coke to make it well worth while. If you decide to do that substitute flaring type tuyeres 3½ x 6¾ x 16⅞ in. Use six equally spaced with the small end opening into the windbox.

We believe that you will obtain better cupola operation by making all iron charges the same, including the first. Droplets of iron should begin to appear at the tuyeres in 3½ to 4 minutes, and at the taphole in 8 to 10 minutes after the wind is turned on. You mention that it takes 20 minutes; this indicates that your bed is too high. Try reducing it a few inches every day until you come within the 8 to 10 minute range. As previously mentioned, we would check the pressure gage to see that it is operating correctly since the pressure should be around 16 oz. See that all joints in the blast pipe from fan to cupola are tight, and that the blast gate, if one is in the line, also is as tight as it can be made. If the joints are not tight, a considerable loss of air can be expected. Possibly you may have to speed up your fan—especially if you desire to melt say 4 tons per hr. As mentioned earlier, the present rate of 1700 cfm should melt around 3.5 tons per hr, but we would do some careful checking to be sure that the fan actually is delivering that quantity of air to the cupola.

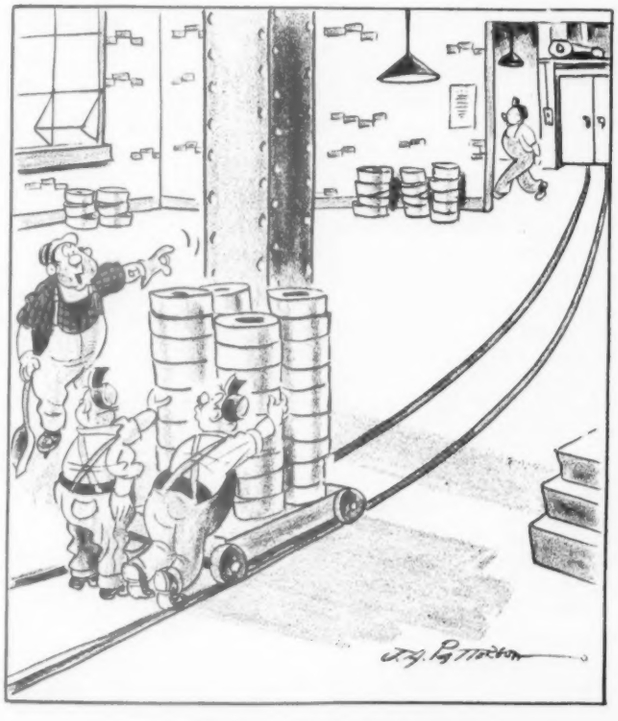
Gives Application of Fly Ash

Q.—We are located in England and from time to time have noted references to fly ash, especially in articles dealing with coreblowing and synthetic resins. It is our impression that the material is flue dust, but we are not sure.

A.—While possibly the term fly ash might correspond to what you call flue dust, it might be well to point out that in the United States, it is the fine, light ash resulting from the burning of powdered coal in industrial furnace installations, more particularly those in which the public utility industries operate continuously under more or less uniform loads. The material is screened to provide a product that falls within a definite classification.

GANGWAY!

By J. A. Patterson



"Just follow th' tracks—You can't miss it!"

Intends Making Tablets From Ounce Metal

Q.—We are opening a small bronze foundry for making grave markers, tablets and ornamental work, and would like to know if there is a book on the subject. We particularly are interested in melting 85-5-5-5 bronze so that it is free from gas porosity and pinholes. Is it necessary to add small amounts of tin and zinc? Can you give us a good facing mixture?

A.—We do not know of any book which describes the procedures for making bronze grave markers and similar castings. A few books were available on nonferrous practice, but unfortunately they now are out of print. However, if you are familiar with the production of other types of brass and bronze castings, you can by careful attention to details, soon gain the necessary skill for making the class of work you mention. Usually in tablet and ornamental work with fine detail a strong facing sand is required, and of necessity it is a fine grade of sand to provide the desired smooth surface. Often it is formed of all new sand while in other cases it may be composed of half new and half old sand with a slight addition of clay well mixed to insure uniform product.

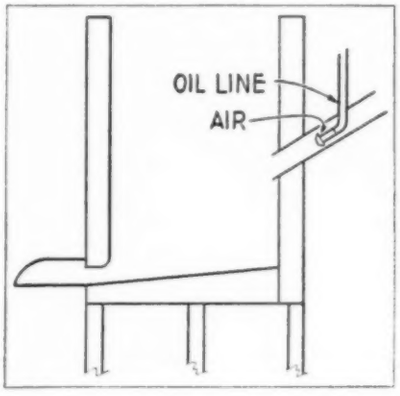
Practice of many tablet, lamp fixture and ornamental casting producers is to flour the surface of the molds, and then skin dry them which is said to give extremely smooth surfaces on the castings. Naturally, in producing fine, delicate work care must be taken to see that the mold cavities are free from any dust or loose sand. Hence, before closing the mold the drag and cope should be blown out.

As far as melting is concerned, the more rapidly the metal can be brought up to the desired pouring temperature, the less the chance for picking up deleterious gases such as hydrogen. However, after reaching the required temperature, the molten metal must not be allowed to soak in the furnace. Hence, always have molds ready to pour. You do not mention what type of melting unit you propose to use, but it may be pointed out that with natural draft, coke-fired furnaces the crucible should set in the furnace so that the top is a few inches above the flue opening to prevent gases of combustion from sweeping over the metal. Also see that the stack is large enough and high enough to provide a good draft, and that the flue opening as well as the grate openings are sufficient to permit free exit of gases and enterance of air, respectively. With oil or gas-fired furnaces, see that the burner adjustments provide a slightly oxiding flame. Do not permit part of the cold or solid metal to project above the crucible top at the beginning of melting. Use a crucible extender—a section of an old crucible—on top to protect such metal.

Ordinarily, using good melting practice with good quality ingot metal and return scrap, you will not need to add any tin or zinc to the charge. However, to be sure of that point, it will be necessary to have analysis made of the metal after pouring. Drillings may be taken from defective castings, spures, etc.

Wants To Build Furnace For Melting Iron

Q.—We would like some information on how to build an oil furnace for melting cast iron. We have an oil furnace in which we melt brass and tried to melt iron in it. Iron was melted in 20 minutes but not hot enough to pour, although it might have been if we had let it run longer. Furnace is like the sketch, using an oil nozzle similar to that for spraying trees. Do you think if we had a regular oil burner that it would melt better?



Oil burner projecting through furnace wall at an angle supplies the heat

We found a reference in an old book on foundry practice that a barrel type furnace melted iron in 1 hour with the oil pressure at 3 psi, but no mention is made of the air pressure. We would like to build the furnace ourselves as we operate only a small shop for repair work casting once a week. One big enough to melt 200 or 300 lb would be sufficient.

A.—While we understand your desire to make your own melting furnace, our opinion is that you will be much further ahead to purchase one from any of the numerous manufacturers who specialize in that field. As a general rule, home-made equipment, unless made by an expert, does not function efficiently or economically. There is a great deal more to a furnace than a refractory lined chamber with a burner thrust through a hole in it. In the first place, the burner must be designed so that intimate mixing of oil and air occur to provide complete combustion. That means proper nozzle construction so that the oil is atomized to the desired degree, and the nozzle located correctly with relation to the air stream so that oil and air are mixed effectively and intimately in the proper ratio. Likewise, the relation of burner to furnace chamber must be such that the maximum heat generated by the combustion of fuel is applied where it is wanted.

In the furnace you now are using, according to the sketch submitted, the flame impinges directly on the material to be melted. That, in our opinion, is not the best practice since it will lead to excessive oxidation, particularly when an oxidizing flame is employed, and to gas absorption when a reducing flame is used. If the burner were placed straight so that it did not impinge on the charge, we doubt that it would melt very fast even with a cover at the top to keep the heat within the chamber as well as reflect it down on the charge.

Consequently, the barrel type furnace you mention would appear to be a better proposition for a melting unit, and units of that type are being used for nonferrous melting. We understand that they also have been used at times for melting gray iron, but we have no information on success of the practice. If you were to construct such a furnace, we believe that it would be preferable to select the diameter and length so that the bath of metal would be comparatively shallow since heat absorption would be from radiation and reflection from the furnace walls. However, it should not be so shallow that excessive oxidation takes place along the edges. Possibly you might be able to construct a barrel type furnace from an old drum and might operate satisfactorily for the purpose you have in mind. Trunnion at one end will have to be hollow so that the oil burner can be inserted.

Core Cutting Tendency Spoils Bushings

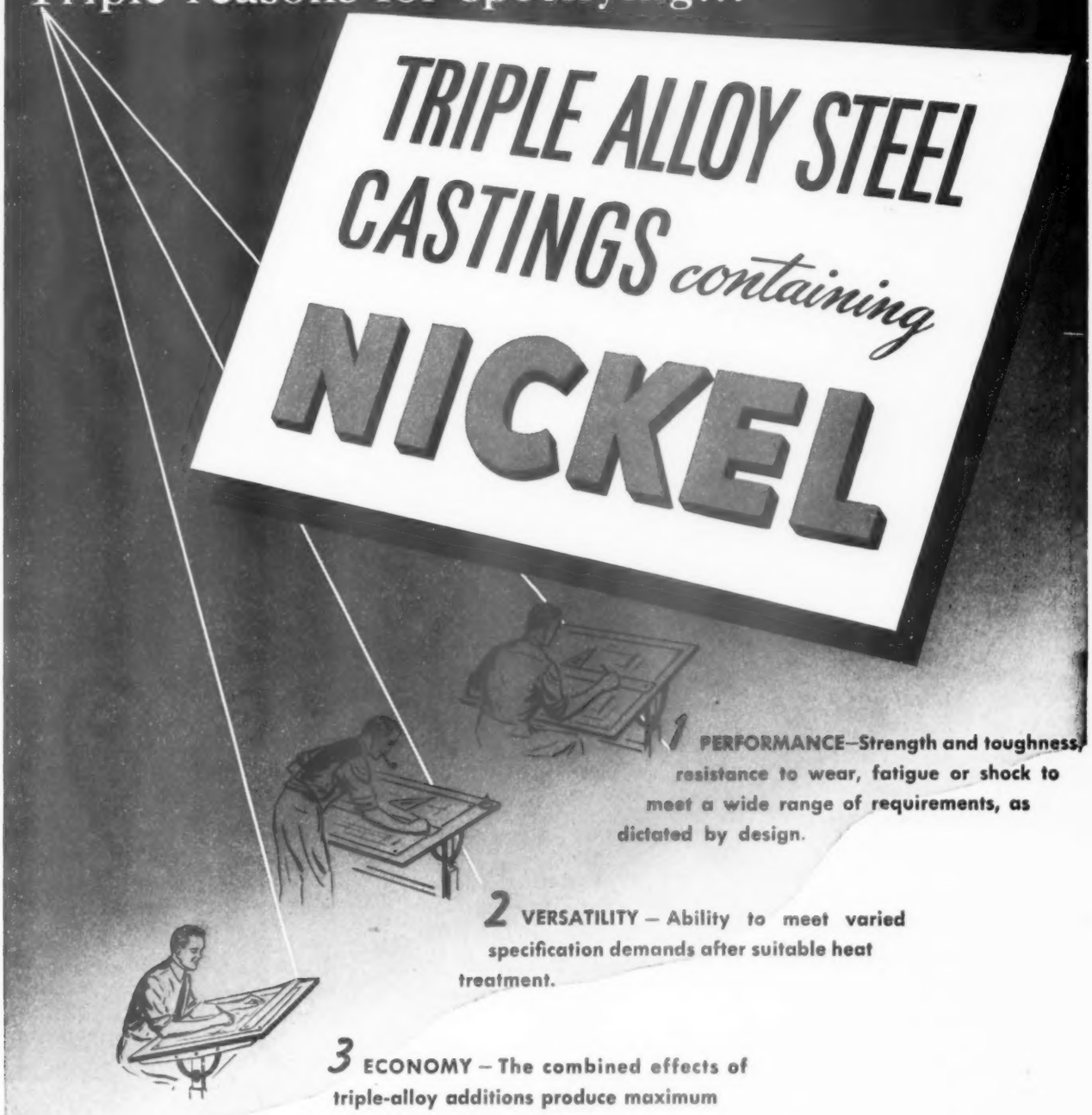
Q.—We are making quite a few heavy 85-5-5-5 bronze bushings with flanges. They are 12 to 14 in. long and from 7 to 12 in. diameter with wall thickness up to 2½ in. We are casting them vertically but are having trouble with the core cutting. Can you give us a suitable core mix formula using a linseed oil binder? We have checked the pouring temperature on the brass and it seems to be about as low as we can carry.

A.—While your core cutting troubles may be due to the sand mix you are using, possibly you might be able to eliminate them by coating the cores to provide a more resistant skin. Materials used for the base of the coating include talc, plumbago or silica flour. Those may be mixed with molasses water, water containing silicate of soda or waterglass, or

(*Concluded on page* 118)

Triple reasons for specifying...

TRIPLE ALLOY STEEL CASTINGS *containing* NICKEL



1 PERFORMANCE—Strength and toughness, resistance to wear, fatigue or shock to meet a wide range of requirements, as dictated by design.

2 VERSATILITY – Ability to meet varied specification demands after suitable heat treatment.

3 ECONOMY – The combined effects of triple-alloy additions produce maximum hardenability at low alloy cost.

Triple-alloy steel castings have established outstanding service records in some or the most exacting industrial applications. Many of the lower alloy types can be handled in the shop with techniques not differing greatly from those employed with carbon steels.

We invite inquiries regarding the production, treatment or uses of triple-alloy steels, containing Nickel.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N. Y.

(*Concluded from page 116*)

core oil. In the latter case the material is made like a paste and rubbed into the skin of the previously baked core. After the core is coated it is dried or baked to drive off moisture or other vehicle. Sometimes more than one coat is needed, then each coat should be dried thoroughly before applying the next.

If you think it is advisable to change your core sand mix, we suggest that you use only a lake sand and linseed-base core oil in the ratio of 1 part oil to 60 or 80 parts sand. If additional green strength is required try adding a small amount of cereal binder, say 1 part. Possibly for the bushing cores it might be a good idea to use a fine sand for the skin and coarse sand for the interior to provide high permeability.

Plans the Construction Of an Oil Burner

Q.—Since coke no longer is available in this part of the country we shall have to switch to oil fuel in our brass furnace. Is there any book from which we can get specifications and information that will enable us to construct and install an oil burner? Can you supply a sketch or drawing that would serve the purpose?

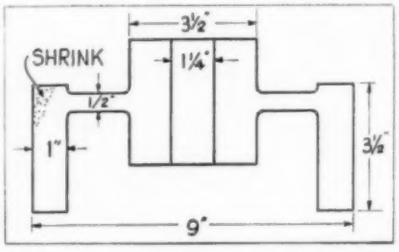
A.—We have no material that would assist you in making an oil burner for your furnace. Although apparently simple, an oil burner is a tricky piece of mechanism. Nice adjustment of every part is necessary to insure maximum performance. Our suggestion is that you order a burner from one of the manufacturers of furnaces and accessories whose names and addresses appear regularly in the advertising pages of THE FOUNDRY. Give them the size of the furnace and crucible and they will supply a suitable burner and a lot of useful and practical advice on the installation and operation.

Hold Steam Responsible For Casting Defect

Q.—The attached sketch shows a small cast iron sheave in which six grooves are machined in the face. The castings apparently are perfect when shaken out, but shrinkage appears when the tool cuts into the upper groove. We have tried risers on the side and on the top, but without result. Iron conforms to the following analysis: Si 2.50 per cent, Mn 0.80 per cent, S 0.03 per cent P 0.45 per cent.

A.—The defect to which you refer is not caused by shrinkage, as the term usually is understood; that is, failure to provide additional metal to compensate for the loss of volume as the metal solidifies in the mold. The cavities or defective areas in the casting are caused by steam generated in the sand mound forming the inside of the mold. When the mold is filled, this mound is enclosed in a liquid metal wall and the top is covered with molten metal. This condition not only develops a maximum amount of steam, but also prevents exit of the steam except through the bottom of the mold.

Where proper and ample exit is not provided, a certain amount of steam tries to escape through the liquid metal and becomes trapped. You can convince yourself by pouring metal into a mold without cope and watching the behaviour of the metal as it rises in the ring wall and covers the mound of sand. In all probability the mold is made in a tight flask with a tight bottom board. In the majority of instances the method is quite



Unless the sand dome is well vented the steam tends to follow the path of least resistance—through the casting

satisfactory. In this particular instance where more than the usual amount of steam is generated, provision must be made for rapid exit through vent holes in the bottom board. With highly permeable sand no further venting is necessary. With lower permeable sand it may be necessary to vent the drag sand with a wire.

Possibility exists that you may have your sand on the wet side, and that is a point worth looking into. Try reducing the moisture content to the lowest point that will give you a workable sand. With this particular defect the composition of the iron has no bearing. If it is suitable for the intended service, that is the only requirement, Also the style of gating will make little difference as long as a sound casting is produced. The same reasoning applies to need for a riser, Often such castings are made without any.

Operational Data for Medium Size Cupola

Q.—We would like to obtain answers to the following questions relating to cupola operation. What is the correct volume of air for a 36-in. cupola with a 42-in. bed, a 1000-lb iron charge and about 8 to 1 coke ratio? What is the correct height of tuyeres above the sand bottom and correct size of tuyeres? We want to tap about 800 to 1000 lb per tap until we can get to a continuous melt, and desire a height which will be suitable for batch taps now and continuous tapping later. Also what is the correct height for the charging door above the sand bottom?

A.—A cupola lined to 36 in. has a cross-sectional area of 1017.36 sq in., and usually the tuyere area in such a cupola is about one-fifth to one-sixth of the former, or 200 to 170 sq in. Generally, six tuyeres are used equally spaced around the circumference, so the area of each would be 33 and 28 sq in., respectively, in round figures. Tuyeres could be 3 or 4 in. high. Also they might be flared from back to front horizontally only to about 17 in., giving practically a continuous opening at the face of the lining.

A 36-in. cupola will melt from 5 to 7 tons an hr, and with a coke ratio of 1 to 8 the amount of air to be supplied will be from 2700 to 3800 cfm. Our suggestion would be to get a blower or fan to supply the greater air volume, and if the melting rate does not come up to expectations, you can reduce the air with a blast gate in the line. Height of tuyeres above the sand bottom may be varied to suit any desire. Since the coke in the well roughly occupies about 50 per cent of the space, that will have to be taken into account in calculating the space to hold 1000 lb of iron which has a volume of about 2.1 cu ft.

In other words, the volume occupied by both coke and iron will be 4.2 cu ft, or 7258 cu in. Since the cross-sectional area of the cupola is 1017 sq in., the tuyeres should be slightly over 7 in. above the bottom to provide the desired volume. However, it is advisable to maintain a reservoir of molten metal in the well and not tap it out completely each time. Hence, the height of the tuyere should be increased above the 7-in. minimum previously mentioned. On the basis of the foregoing calculation each 1 in. increase in the height of the tuyeres above the bottom will accomodate 142 lb of iron. Hence, if you desire to have 500 lb remaining after tapping 1000 lb, the tuyere height should be about 10½ in., while if you want 1000 lb to remain, the height should be 14 in.

As for height of charging door above the cupola bottom, there seems to be considerable choice since it ranges in some cases from as low as 10 ft. to 25 ft. Often the height of the cupola door is predicated on the height of the building in which it is located since naturally if the roof is low, the charging platform and door must be adjusted to give headroom. In general, we should suggest the distance range from 16 to 22 ft.

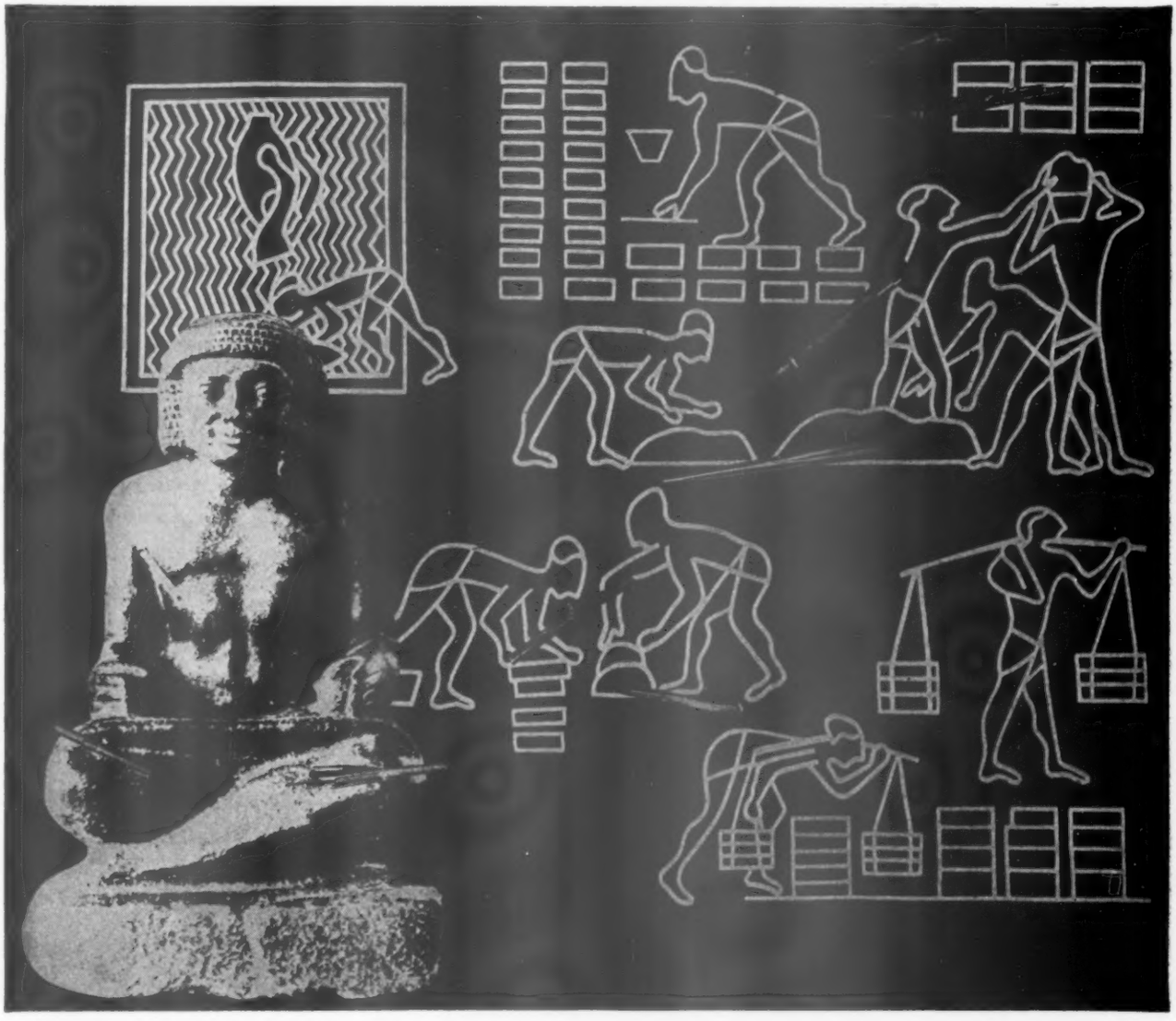
With the charging door a reasonable distance above the tuyehes, the metal charges above that point can be pre heated a certain amount by the hot gases developed by combustion of the coke during the melting operation.

BRICKS WITHOUT STRAW

Long, long ago a penny-conscious Pharaoh tried to cut his cost corners by decreeing that bricks would be made without straw. He found out—the hard way—that scrimping on materials throws product performance and customer good will into full reverse.

Hardenability in steel is analogous to straw in bricks. Leave it out and you invite trouble in. Molybdenum cast steels combine good hardenability with economy, thus insuring good performance on a practical cost basis.

The Pharaoh may possibly have lacked data on the importance of straw in bricks—but there is readily available to all steel users a wealth of practical facts on the advantage of molybdenum-containing cast steels. Investigate *now!*



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MEN of Industry

DAVID C. ZUEGE

DAVID C. ZUEGE, recently elected president of the Wisconsin Chapter of the American Foundrymen's Association, is technical director, Sivyer Steel Casting Co., Milwaukee and Chicago. He was graduated from the University of Wisconsin in 1920 and later received his M. S. degree in metallurgy from the same university. He entered the employ of the Sivyer Steel Casting Co. immediately after his graduation, as a special apprentice. He subsequently held the positions of chemist, research engineer, metallurgist and is now technical director. For many years Mr. Zuege has been active in committee work and local chapter activities of the AFA, American Society for Testing Materials and American Society for Metals. He served two terms as chairman of the Milwaukee Chapter of the ASM.

♦ ♦ ♦

JAMES M. UNDERWOOD

James M. Underwood has been elected president, Vulcan Mold & Iron Co., Latrobe, Pa., succeeding **Edward R. Williams**, who has resigned. Mr. Underwood, a graduate of University of Pittsburgh and of Harvard Graduate School of Business Administration, until recently was director of market research for Latrobe Electric Steel Co. During the greater part of the 1930's Mr. Underwood served as assistant secretary-treasurer and assistant to the president of Vulcan Mold & Iron Co. He then became president, the Halund Co., Latrobe, directing wartime manufacture of patterns for bulletproof airplane gasoline and oil tanks.

♦ ♦ ♦

George Johnstone Jr. has resigned as foundry superintendent, Cooper-Bessemer Corp., Grove City, Pa., to head the recently reorganized Lawrence Foundry Co., Grove City, as president and general manager. Prior to his connection with Cooper-Bessemer, Mr. Johnstone served as foundry superintendent, William A. Hardy & Sons Co., Fitchburg, Mass. He was also instructor in foundry practice and technology at Girard College, Philadelphia, for several years. He received his foundry and metallurgical education at Temple University, and Carnegie Institute of Technology. The Lawrence Foundry has been licensed to produce Meehanite castings. **Harry S. Chambers,** who has been with the company the last 30 years, will remain as general superintendent.

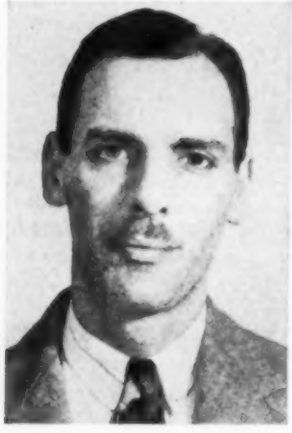
♦ ♦ ♦

Fred S. Price has been named manager, alloy iron department, Union Spring & Mfg. Co., New Kensington, Pa. This is a new department established by the company for the manufacture of high alloy irons. Previously, the concern had manufactured steel castings only. Mr. Price was formerly with Williams & Co., sales agent for the International Nickel Co. in the Pittsburgh territory.

♦ ♦ ♦

Robert H. Hoyt, until recently foundry engineer, Ross-Meehan Foundries Inc., Chattanooga, Tenn., has been appointed foundry superintendent in charge of engineering, pattern shop, erection and operation of a new mechanized gray iron foundry being constructed by the Springs Cotton Mills, Lancaster, S. C. Mr. Hoyt attended Detroit Institute of Technology, City

(*Continued on page* 122)



GEORGE JOHNSTONE JR.

FRED S. PRICE

ROBERT H. HOYT

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

General Sales Offices

1515 First National Building • Birmingham, Alabama • Phone 4-6786

(*Continued from page* 120)

College of Detroit and the Curtiss School of Engineering. In 1932 he became associated with the Dodge Main plant, Detroit, and was subsequently electric furnace melter, Ford Motor Co. River Rouge foundry; plant engineer, Chrysler Corp.; chief engineer, Roper Mining Corp.; industrial specialist in charge of priorities on steel castings and forgings, War Production Board, Iron and Steel Branch, Washington; foundry manager, Lombard Iron Works, Augusta, Ga., and foundry engineer, Lakey Foundry & Machine Co., Muskegon, Mich., until he became foundry engineer, Ross-Meehan Foundries Inc.

♦ ♦ ♦

R. B. Hammond has been appointed general manager, secretary and treasurer, Bellvue Industrial Furnace Co., Detroit. For the last 20 years Mr. Hammond has been associated with Fisher Body Division of General Motors Corp. in various engineering and production capacities, the last four years in charge of process engineering on the tank program. **E. W. Schoen** has been appointed metallurgical engineer in conjunction with sales. Mr. Schoen has had 18 years of experience in metallurgical control and fabrication of steel mill products, installation and operation of heat treating equipment and quality control of automotive and aircraft parts. For the last four years he has acted as a consultant metallurgical engineer working with small defense plants and a manufacturing chemical company.

♦ ♦ ♦

Leslie C. Thellemann has been appointed treasurer of Kencroft Malleable Co. Inc., Buffalo. Since 1942 Mr. Thellemann had been secretary of Inter-Allied Foundries of New York State. As previously announced, Kencroft Malleable Co. Inc., formerly known as Jewell Alloy & Malleable Co. Inc., is headed by Ralph T. Rycroft as president and Ward H. Kendrick as vice president. Ralph T. Rycroft Jr. is secretary.

♦ ♦ ♦

Gordon E. Brown has been appointed field engineer in the Hartford, Conn., district office, Ampco Metal Inc., Milwaukee. Mr. Brown has been in the company's main office at Milwaukee since he was released from Army Ordnance with the rank of major. Prior to military service he was associated with the Texas Co., New York, for seven years, in the industrial sales department.

♦ ♦ ♦

A. J. Edgar, technical advisor of the Gray Iron Founders' Society, has resigned. Mr. Edgar had been associated with the society since 1942, serving primarily as a technical consultant. A graduate of Michigan State College in 1932, he was associated for four years with the Saginaw Malleable Iron Division of General Motors Corp., Saginaw, Mich., and prior to joining the Gray Iron Founders' Society he was foundry superintendent, General Railway Signal Co., Rochester, N. Y.

♦ ♦ ♦

Harold L. Geiger, head of the Chicago Technical Section of the Development and Research Division, International Nickel Co. Inc., has been elected chairman of the Chicago Chapter of the American Society for Metals for the year 1946-47. Mr. Geiger has served as vice chairman of the chapter during the last year. He has been associated with International Nickel for many years and was formerly chief metallurgist, Wisconsin Steel Co., subsidiary of International Harvester Co.

♦ ♦ ♦

J. F. Weller has been appointed sales assistant to the president, American Brake Shoe Co., New York. A graduate of Yale University, Mr. Weller was president of the Kellogg Division when it was acquired by American Brake Shoe Co. in 1939, a position which he held until 1945. In 1943 he was appointed director of automotive sales for both Kellogg Division and American Brakeblok Division. In his new appointment he will represent the entire company by promoting sales for all divisions of the organization.

♦ ♦ ♦

Douglas J. Strong, recently released from active duty with the Army Air Forces, has acquired the Foundries Materials Co., Coldwater, Mich., formerly owned and operated by **Luther Curl,** who died Mar. 29. Mr. Strong, the new president and director of the company, served his apprenticeship in the Homer Furnace & Foundry Corp., Coldwater, founded by his grandfather, Samuel D. Strong. Mr. Strong's father also is a foundryman and is active in the business today. He was attending Cass Technical Institute of Metallurgy when he entered military service, and upon his return resumed his metallurgy studies at Wayne University, Detroit.

♦ ♦ ♦

Lt. Comdr. Max L. Murdock, after 4½ years' service in the Navy, has returned to the Allis-Chalmers Mfg. Co., Milwaukee, as assistant manager of the centrifugal pump section, at the Norwood, O., works. **A. W. Kremser,** formerly field engineer at the Chicago office, has been appointed branch manager of the Davenport, Iowa, office, succeeding **C. J. Schutty,** who has been transferred to the Kansas City, Mo., office. Mr. Kremser joined Allis-Chalmers in 1924.

♦ ♦ ♦

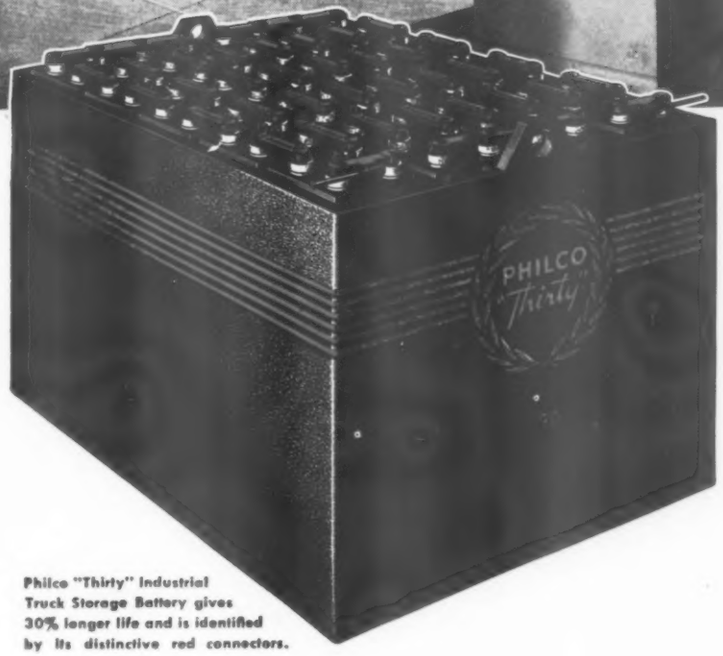
C. George Segeler has been appointed chairman of the Nonferrous Metals Committee, American Gas Association, which supercedes the Aluminum and Magnesium Melting Committee of which Mr. Segeler was chairman. The new com-

(*Continued on page* 126)

R. B. HAMMOND

E. W. SCHOEN

LESLIE C. THELLEMANN



Philco "Thirty" Industrial Truck Storage Battery gives 30% longer life and is identified by its distinctive red connectors.

MODERN ELECTRIC INDUSTRIAL TRUCKS POWERED BY COST-SAVING PHILCO "THIRTY" STORAGE BATTERIES

Now you can get the kind of industrial trucks experience has proved the safest, most flexible and maintenance-free—ELECTRIC TRUCKS! And you can power your trucks with the greatest materials handling development since the fork-lift truck, itself—PHILCO "THIRTY", the Storage Battery with 30% longer life! Plan now for the big demands increasing production will place on your materials handling equipment. Philco "Thirty" will give your trucks top capacity, *plus* savings in maintenance, depreciation and replacements. Write today for new catalogs giving specifications.

FOR 50 YEARS A LEADER IN INDUSTRIAL STORAGE BATTERY DEVELOPMENT

PHILCO CORPORATION • STORAGE BATTERY DIVISION • TRENTON 7, NEW JERSEY

PHILCO *Famous for Quality the World Over*

SIGNPOSTS TO MORE PROFITABLE

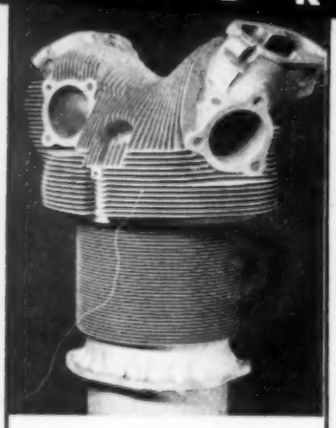
With the exception of repeat orders*, practically every one of the more than 3500 Wheelabrators now installed has been a replacement of some other type of equipment.

As such the Wheelabrator has had to win its way by proved competitive performance: faster cleaning speeds . . . . lower production costs—higher quality cleaning—money saved.

Each installation has been made on the basis of measurable results . . . . results that conclusively proved the wisdom of installing Wheelabrator equipment. Note the typical case histories mentioned below. The overwhelming changeover to the

WHEELABRATED

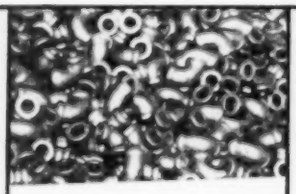
A Milwaukee Valve Mfg. plant reduced cleaning operations from 32 to 6½ man hours a day with the installation of a Wheelabrator Tumblast. Cleaning time was reduced 79%.



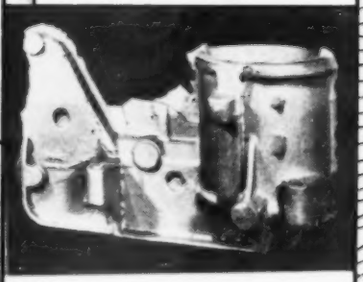
A perfect bond for metallizing is provided at production line speeds on aircraft cylinder heads with Wheelabrator Special Cabinets at Wright Aeronautical Corp.

A cost saving of over 60% besides improving appearance of finished railroad castings resulted from the installation of a Wheelabrator Monorail Cabinet at New York Air Brake Co., Watertown, N. Y.

Loads of gear blanks averaging 400 pounds each are cleaned in 3¾ minutes in a 27 x 36" Wheelabrator Tumblast at a Kansas City Jobbing foundry.



600 pounds of malleable pipe fittings are cleaned ready for galvanizing in a 36" x 42" Wheelabrator Tumblast in just ten minutes at Union Malleable Mfg. Co., Ashland, Ohio.



$23.60 daily savings in cleaning costs resulted from the installation of Wheelabrator equipment at Fulton Foundry and Machine Co., Cleveland.

American

WORLD'S LARGEST BUILDERS

CLEANING

Wheelabrator that has taken place in the foundry industry is one of the SIGNPOSTS to profitable cleaning that should be considered when you select new blast equipment.

Write us if you haven't yet had the full story about the Wheelabrator and what it can do for you.

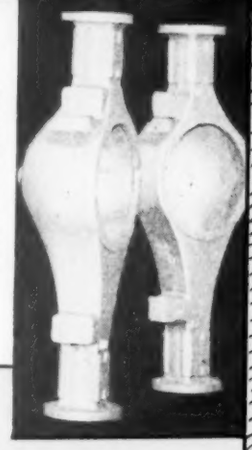
★ 37 plants use from 10 to 173 machines, 322 other plants use from 2 to 10 machines, 1210 plants use 1 machine.

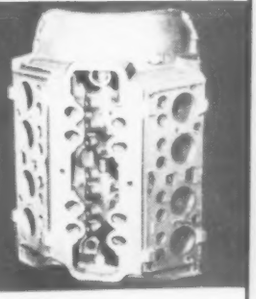
BLAST CLEANING

WHEELABRATED

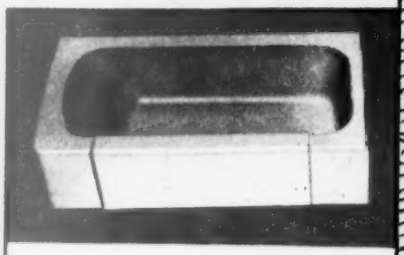
Aluminum drill handle castings are Wheelabrated so thoroughly in 2 minutes that no further preparation is required for painting. A three minute polishing operation was eliminated.

All surfaces of cast axle housings including interior cavities are thoroughly cleaned at the rate of one every 2½ minutes in a Wheelabrator Special Cabinet at an Ohio malleable foundry.



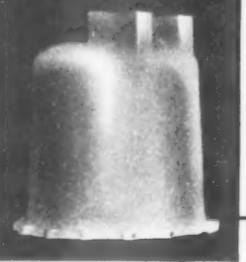


125 cylinder blocks are Wheelabrated hourly in a Wheelabrator Monorail Cabinet at a prominent Detroit foundry.



180 large cast bath tubs are cleaned hourly in a Wheelabrator Special Cabinet at a Southern Sanitary Ware Mfg. plant. Sinks, lavatories, wash bowls and other small ware are also cleaned on this machine.

WHEELABRATED



250 cast automotive crankshafts are cleaned hourly in a Wheelabrator Monorail Cabinet at Auto Specialties Mfg. Co., Benton Harbor, Michigan.

120 to 160—18" cast brake drums cleaned hourly in a Wheelabrator Monorail Cabinet at General Foundry & Mfg. Co. Tumblers did only 14 in 50 minutes.

A saving of 16.1c on each railroad brake cylinder or $5,853.96 annually resulted from the installation of a Wheelabrator Cabinet by a New York manufacturer.

More than 60 tons of brass fittings are cleaned daily in a 36 x 42" Wheelabrator Tumblast at Ohio Injector Co., Wadsworth, Ohio. A load of fittings is cleaned in just 3½ minutes.

FOUNDRY EQUIPMENT CO.

505 S. BYRKIT ST. MISHAWAKA, INDIANA

OF AIRLESS BLAST EQUIPMENT

(*Continued from page* 124)

mittee will study melting practices and heat treating processes to evolve the most efficient procedures through the use of gas fired equipment. Mr. Segeler is utilization engineer of the association.

♦ ♦ ♦

George P. Torrence is returning to the Link-Belt Co., Chicago, July 1, as executive vice president, and will become president Nov. 1, when **William C. Carter** retires. Mr. Torrence was with the company from 1911 to 1936, when he resigned as president. Since that time he has been in Cleveland as vice president and general manager, Rayon Machinery Corp., subsidiary of the Industrial Rayon Corp., and as president, Cleveland Pneumatic Tool Co.

♦ ♦ ♦

Herbert T. Florence has been elected president and general manager, the Cleveland Crane & Engineering Co., Wickliffe, O. Mr. Florence has been general manager of the company since 1938 and vice president since 1941. **C. A. G. Garnett,** formerly secretary and treasurer, has been named vice president and treasurer. **W. G. Wehr** succeeds Mr. Garnett as secretary and **W. D. Vanderbilt** becomes assistant secretary.

♦ ♦ ♦

Laurence H. Hahn, who has been elected president of the Chicago Chapter of the AFA for 1946-47, has been engaged in steel foundry work for 24 years, this entire time being associated with Sivyer Steel Casting Co. At present he is metallurgical supervisor of the company's Chicago plant, and is melting superintendent of the home plant in Milwaukee as well as that in Chicago. A native of Reedsburg, Wis., Mr. Hahn was graduated from the University of Wisconsin in 1921 and received his master's degree there in 1922. Becoming associated with Sivyer Steel Casting Co. in Milwaukee immediately thereafter, he spent two years as an apprentice. From 1924 to 1932, he was a sales engineer, then spent a year in the melting department. This was followed by a year in foundry supervision and a year in metallurgical research. In 1935, Mr. Hahn was transferred to Sivyer's Chicago foundry as plant metallurgist, and in 1939 undertook his present broader duties. For a number of years he has been active in committee work of the Chicago Chapter, AFA. Elected a director in 1944, he was advanced to vice president late in 1945 to fill the vacancy created by resignation of the incumbent, and until his election as president in May of this year served as program chairman.

♦ ♦ ♦

Richard F. Garretson has been appointed eastern regional manager, Ransome Machinery Co., Industrial Division, Dunellen, N. J., subsidiary of Worthington Pump & Machinery Corp., Harrison, N. J. Mr. Garretson, who joined the company in 1936, will have charge of sales of welding and work positioning equipment, with headquarters in Philadelphia. Before entering the Army he helped plan production schedules in war plants and shipyards.

♦ ♦ ♦

Raymond J. Dervey has been put in charge of the Pittsburgh office of the American Hoist & Derrick Co., St. Paul, succeeding **Ralph Thomson,** who has been appointed manager of the New York office, after representing the company through the Pittsburgh office for many years.

♦ ♦ ♦

M. E. Burkhart has been made vice president, K. P. Wesseling Co., St. Louis, in charge of its new engineering department which will provide professional engineering consultant service on forgings, machine and cutting tools. Mr. Burkhart formerly was vice president of the Key Co., East St. Louis, Ill., where he designed and supervised operations of the foundry and machine shops.

♦ ♦ ♦

Wilbur Thomas, recently appointed foundry superintendent of the Bowler Foundry Co., Cleveland, was born and educated in that city. During summer vacations he worked in the foundry office of the Kilby Mfg. Co., and following graduation from high school in 1920 served a four-year apprenticeship in the foundry. Later he worked as a journeyman molder in several Cleveland foundries. In 1938 he returned to the Kilby foundry as assistant superintendent and was appointed superintendent in 1940. Mr. Thomas studied cupola practice with David McLain, Milwaukee, night courses in blueprint reading, job planning and foundry technology and practice at Cleveland Trade School.

♦ ♦ ♦

Earl R. Pierce, formerly a director and general superintendent, iron and Steel Division, National Roll & Foundry Co., Avonmore, Pa., has become associated with Peter Soffel, president, Pittsburgh Metals Purifying Co., Pittsburgh, in the development and marketing of a new exothermically reactive material for use in the casting of metals.

♦ ♦ ♦

Stevens H. Hammond, president, Whiting Corp., Harvey, Ill., has been made a director of the Foundry Equipment Manufacturers Association, to replace Harry T. Worthington, formerly of Beardsley & Piper Co., Chicago, who has now left the industry.

♦ ♦ ♦

William E. Mahin has been appointed chairman of metals and minerals research, Armour Research Foundation of Illinois Institute of Technology, succeeding **Dr. Raymond G. Spencer,** who has become

(*Concluded on page* 128)

GEORGE P. TORRENCE

HERBERT T. FLORENCE

LAURENCE H. HAHN

SLY TUMBLING MILLS

The SLY name on your Tumbling Mills has been the Standard of Sturdiness for many years.

Modern Design Throughout

Anti-Friction Bearings — Direct Motor Drive

Sturdy Construction for

Long Life — Low Maintenance

SLY TUMBLING MILLS
Can be Furnished as Follows:

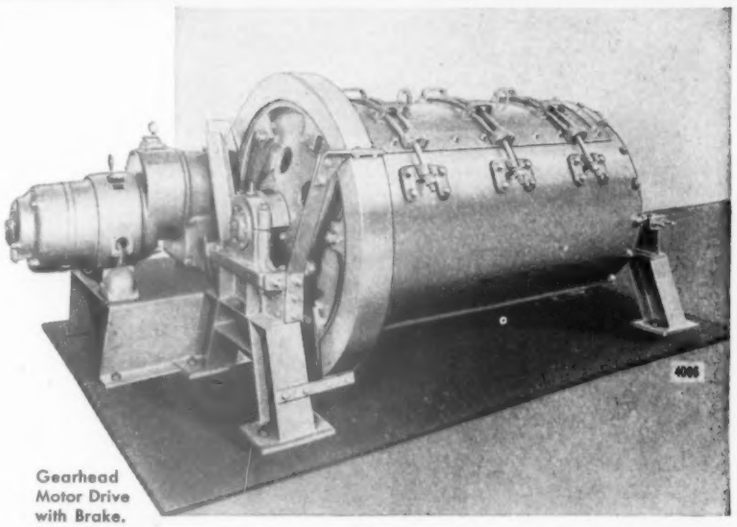
Inside diameters: 24″, 30″, 36″, 42″, and 48″.
Inside length from 36″ up.

Special Designs for

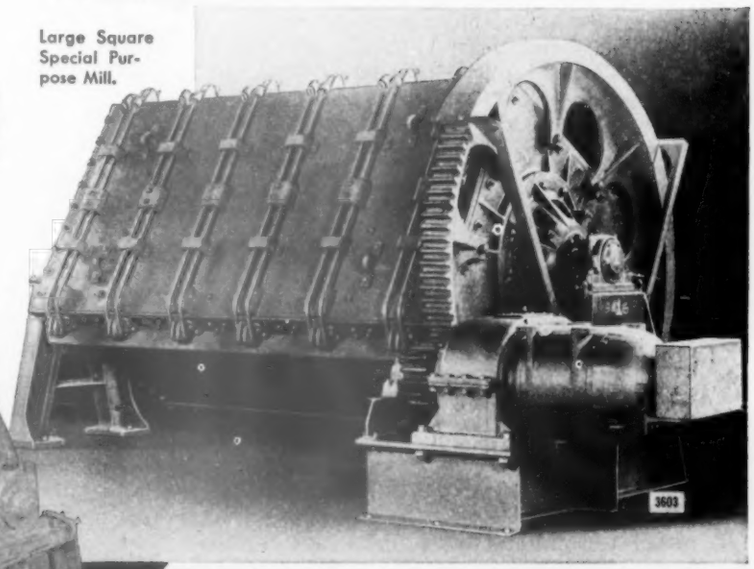
Stove Plate	Sprue Cleaning
Soil Pipe	Welding Rods
Waterpipe Fittings	Cast Anchor Chain

Drives for Mills

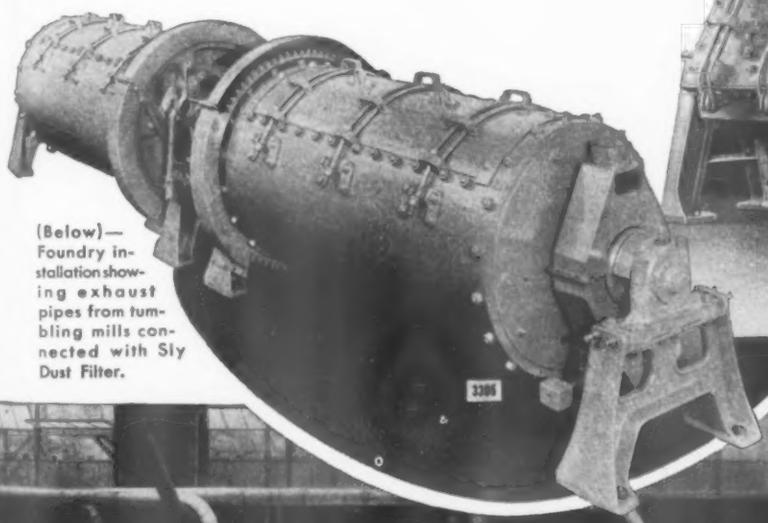
For greatest flexibility we recommend individual direct motor drive, but mills can also be furnished with V-belt drive, or tight and loose pulley for flat belt drive.



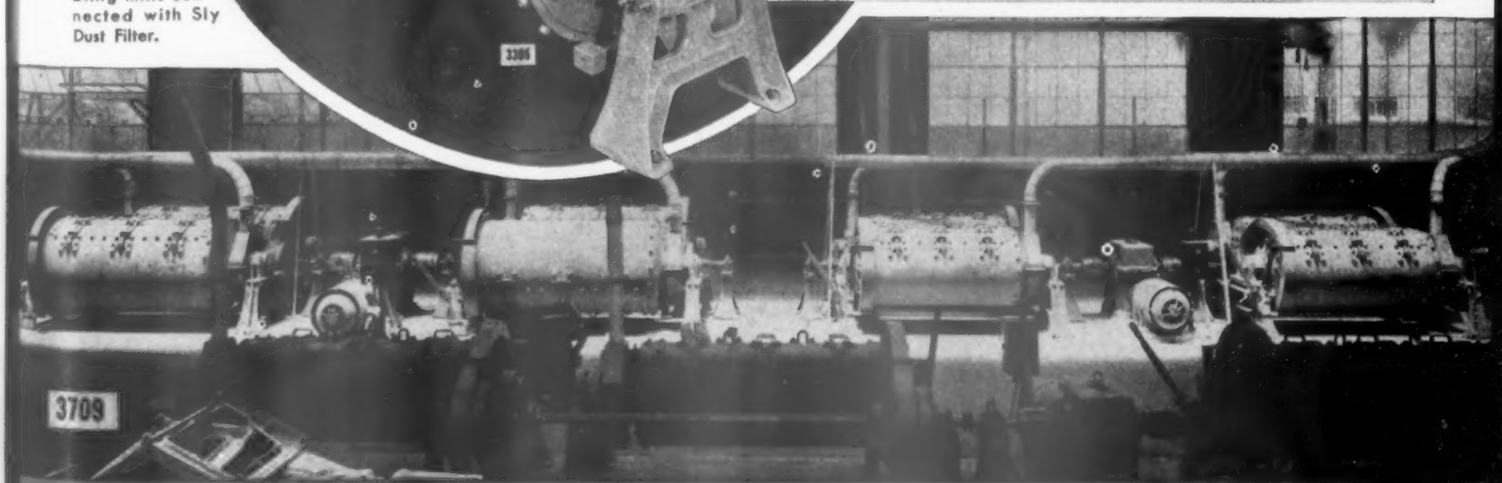
Gearhead Motor Drive with Brake.



Large Square Special Purpose Mill.



(Below)—Foundry installation showing exhaust pipes from tumbling mills connected with Sly Dust Filter.



THE W. W. SLY MANUFACTURING CO.

4753 TRAIN AVENUE — CLEVELAND 2, OHIO

(*Concluded from page 126*)

research director of Washington University Research Foundation. Mr. Mahin, a graduate of Notre Dame University, received his master of science degree from Carnegie Institute of Technology. He was in charge of metallurgical engineering at the East Pittsburgh plant of Westinghouse Electric Corp., for ten years, and spent more than seven years in alloy research and development work with Vanadium Corp. of America at Bridgeville, Pa.

♦ ♦ ♦

C. M. Mense, president and general manager, Lehigh Safety Shoe Co., Allentown, Pa., has retired from active direction of the company but will continue in an advisory capacity. **Frank B. Griswold,** recently released from military service in the Army, has been appointed to replace Mr. Mense as general manager. Mr. Griswold entered the organization in the sales department, later becoming merchandise and sales manager.

♦ ♦ ♦

R. H. Porterfield has been appointed manager of a new branch office recently opened in Providence, R. I., by Allis-Chalmers Mfg. Co., Milwaukee. Mr. Porterfield, a graduate of University of Nebraska, has been associated with Allis-Chalmers since 1939. **R. E. Scudder,** who joined the company in 1945, following his release from the Navy, has been assigned to the new office as a salesman. Mr. Scudder attended Northeastern University.

♦ ♦ ♦

Clinton H. Moore, formerly sales supervisor for Swan-Finch Oil Corp., New York, in New Jersey, Pennsylvania, Maryland and Delaware, now has charge of sales in the Great Lakes district, comprising Michigan, Ohio, part of West Virginia, Buffalo and Pittsburgh.

♦ ♦ ♦

Henry F. Schroeder, formerly vice president and manager of Milwaukee Die Casting Co., Milwaukee, has been elected president, succeeding **Frederick J. Schroeder Sr.,** deceased. **Frederick J. Schroeder Jr.** has been electetd vice president, in addition to his present position as treasurer. **Lillian M. Wood** was re-elected secretary of the company.

♦ ♦ ♦

William J. Wadsworth Jr., formerly director of sales, R. Hoe & Co. Inc., New York, has been appointed foundry manager, Noble & Wood Machine Co., Hoosick Falls, N. Y.

♦ ♦ ♦

W. Luther Lewis has been elected president, Chicago Pneumatic Tool Co., New York, succeeding **H. A. Jackson** who has resigned. Mr Lewis, formerly assistant comptroller, Bethlehem Steel Corp., became vice president, secretary and treasurer of Chicago Pneumatic Tool Co. in 1930 and has been executive vice president since 1931. Mr. Jackson, president of the company for the last 28 years and chairman of the board of directors for 14 years, was re-elected board chairman, resigning as president at his own request.

♦ ♦ ♦

Samuel Appelby has been appointed works manager, Colonial Foundry Co., Louisville, O. For the last eight years Mr. Appelby had been superintendent, Buffalo Foundry & Machine Co., Buffalo, and prior to that was assistant

SAMUEL APPELBY

foundry superintendent, McIntosh & Seymour Diesel Engine Division, American Locomotive Co., Auburn, N. Y., for 14 years. He is an active member of the American Foundrymen's Association and the Operators' Group, Gray Iron Research Institute.

♦ ♦ ♦

Raymond A. Durand, formerly assistant sales manager of Edward Valves Inc., East Chicago, Ind., has been promoted to sales manager. He has been with the sales department more than 9 years.

♦ ♦ ♦

F. C. Hawks, formerly with the Bridgeport Brass Co., has joined the sales staff of Ampco Metal Inc., Milwaukee, with headquarters at the company's Chicago office.

♦ ♦ ♦

Lt. Col. J. W. Ward, after 4½ years of service with the armed forces, has returned to the sales force of Wright Mfg. Division of American Chain & Cable Co. Inc., Bridgeport, Conn., with headquarters in Cleveland.

♦ ♦ ♦

C. C. Brooks, western manager of the hoisting machinery division, Robins Conveyors Inc., Passaic, N. J., has retired. Mr. Brooks, whose headquarters were in the Chicago office, joined the company in 1934 when it acquired the materials handling section of Mead-Morrison Mfg. Co., with which organization he had been associated for over 40 years.

♦ ♦ ♦

Paul R. Eisenhuth and Walter F. Helies, until recently associated with Velsicol Corp., Chicago, have organized Cyclic Chemical Corp., 75 East Wacker Drive, Chicago, to manufacture and market organic and inorganic chemicals, including core oils. Mr. Eisenhuth was associated with Sherwin-Williams Co. for four years, Standard Ultra Marine Co. for twelve years and the Chemicals Division, War Production Board for four years before joining Velsicol Corp. Mr. Helies spent ten years with the chemical products division of Standard Oil Co. of New Jersey prior to his association with Velsicol.

♦ ♦ ♦

Don A. Gilbert has been appointed Ohio district sales representative for W. S. Rockwell Co., Fairfield, Conn., with headquarters in Cleveland. Mr. Gilbert has had extensive experience in the metallurgical, metal heat processing and kindred fields of industrial heat application.

♦ ♦ ♦

Francis H. Beaupre and Bruno Ramthun have joined the application engineering department of Wheelco Instruments Co., Chicago, to serve in a liaison capacity with the sales application, engineering design, research and production departments.

♦ ♦ ♦

L. Arthur Dawson has been appointed sales and service representative in the eastern Pennsylvania territory of Swan-Finch Oil Corp., New York. Mr. Dawson has been associated with the foundry industry for the last 14 years.

♦ ♦ ♦

Philip Donham has resigned as vice president and secretary-treasurer, Electro Refractories & Alloys Corp., Buffalo. Mr. Donham had been associated with the company for five years.

♦ ♦ ♦

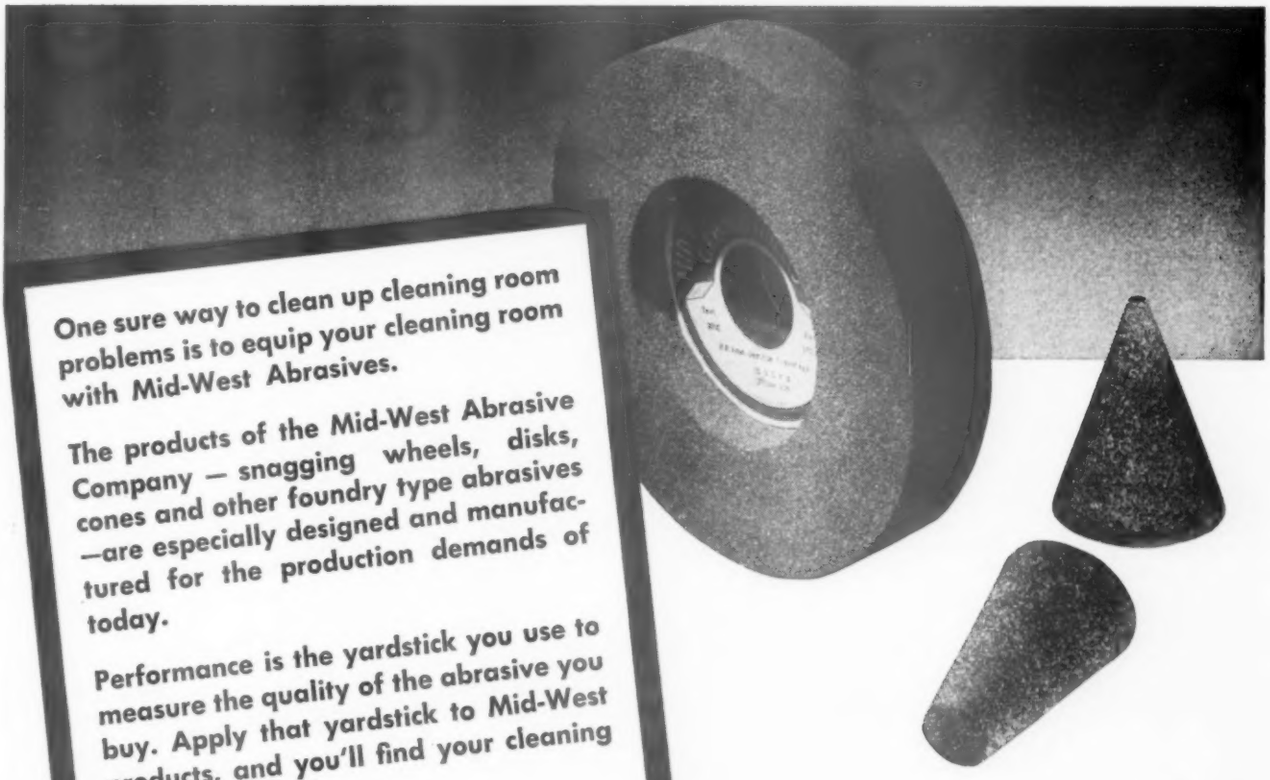
Irwin A. Rose, vice president in charge of manufacturing, Edison General Electric Appliance Co. Inc., Chicago, has resigned to take a similar post with the Maytag Co., Newton, Iowa.

♦ ♦ ♦

J. Kenneth Holmes, president, the Robert Holmes & Bros. Inc., Danville, Ill., has been elected president of the Chamber of Commerce of that city.

♦ ♦ ♦

Carl de Laval has been appointed a sales representative for the Pittsburgh district of Chester Electric Steel Co., Chester, Pa., with headquarters in Pittsburgh.



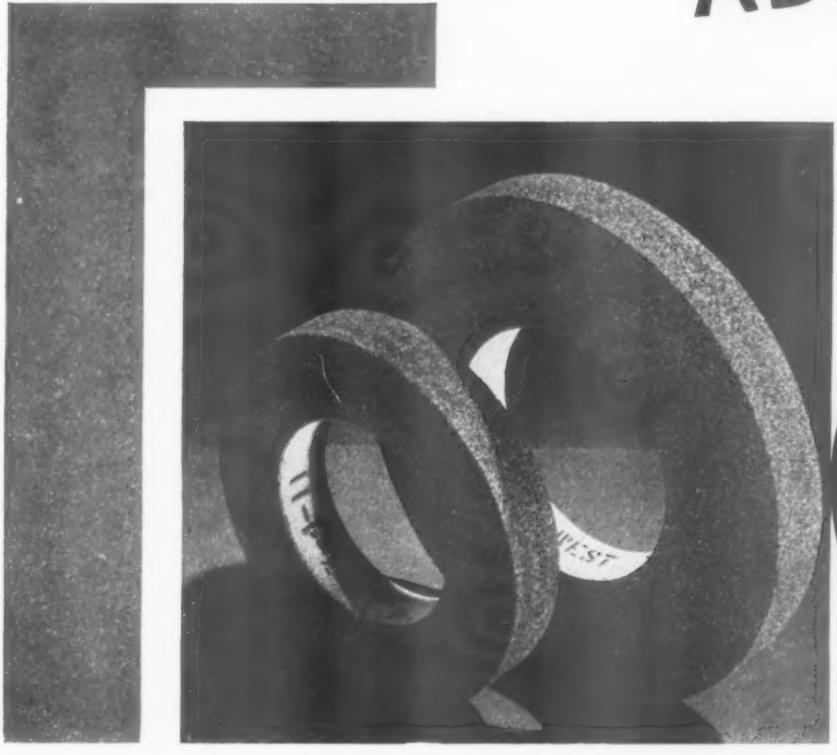
One sure way to clean up cleaning room problems is to equip your cleaning room with Mid-West Abrasives.

The products of the Mid-West Abrasive Company — snagging wheels, disks, cones and other foundry type abrasives —are especially designed and manufactured for the production demands of today.

Performance is the yardstick you use to measure the quality of the abrasive you buy. Apply that yardstick to Mid-West products, and you'll find your cleaning problems solved.

Switch to Mid-West today!

CLEAN UP WITH MID-WEST ABRASIVES



MID-WEST ABRASIVE CO.

Manufacturers of DEPENDABLE Abrasives

OWOSSO, MICH. • DETROIT

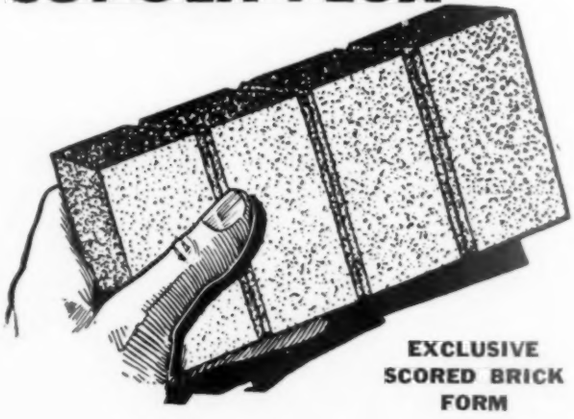
ROCHESTER, PA.

Use Famous CORNELL CUPOLA FLUX

Avoid the reject bugaboo—loss of time, double labor by make-overs, slowed down deliveries, etc.

Famous Cornell Cupola Flux purifies metal and makes it more fluid. Castings come cleaner, stronger, denser grained—and are easier to machine. Also keeps cupolas clean, reduces maintenance.

It takes but a few seconds to use. Promotes accurate measurement. You simply toss in one brick to each ton or break off a briquette (quarter section) for each 500 pound charge of iron. None blows out with the blast—it stays in melting zone until entirely consumed. Write for Bulletin 46-B.



EXCLUSIVE SCORED BRICK FORM

The CLEVELAND FLUX Company

1026-1036 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Brass and Aluminum Fluxes Since 1918

FAMOUS CORNELL FLUXES Trade Mark Registered

Write for Bulletins ➡

Famous CORNELL ALUMINUM FLUX

Produces clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections are poured. Castings take a higher polish. NO FUMES! Exclusive formula prevents obnoxious gases. Metal does not cling to dross.

Famous CORNELL BRASS FLUX

Makes metal pure and clean, even when dirtiest brass turnings or sweepings are used. Produces castings which withstand high pressure tests and take a beautiful finish. Saves considerable tin and other expensive metals. Crucible and furnace linings are preserved.

Famous CORNELL LADLE FLUX

Place a few ounces in bottom of ladle, then tap cupola. Metal is thoroughly cleansed, foreign impurities are easily skimmed off. Ladles are kept clean, there is less patching and increased ladle life. Metal temperatures are retained during transfer to molds.

HAMILTON EMPLOYEES

Receive Service Awards

Employees of Hamilton Foundry & Machine Co., Hamilton, O., with 25 or more years of service. Bottom row, left to right: George Feyh, Peter E. Rentschler, John Nickel, Nicholas Minnelli, Karl Hepting, Herman Mount, Donald McDaniel. Top row, left to right: Frank Baum, Harold Roesch, Carl Grammel, Frank Tutas, Raffaele Infarzato, J. D. Judge, Allen Moore, William Koch, Albert Frazee

MORE than 130 employees of the Hamilton Foundry & Machine Co., Hamilton, O., received service pins in recognition of faithful service to the company, at a dinner meeting, held May 6, at the Hamilton YMCA Camp Campbell Gard. Peter E. Rentschler, president of the company, presided at the dinner, which is to be maintained as an annual event.

Hamilton's Service award pin

In presenting the awards Mr. Rentschler said that it has long been a military custom to recognize valor by presentation of medals and ribbons. The army of industry is a large army with little opportunity for spectacular performance, which goes steadily on its way, courageous, since and loyal, and it should receive for its faithfulness a recognition which goes steadily on its temporary value of monetary reward.

Awards included eighteen 25-year pins, fourteen 15-year pins, fifteen 10-year pins and seventy-three 5-year pins. Following are those who received 25-year pins: George Feyh, an employee for the last 45 years, John Nickel, who has been with the company 41 years, Harold Roesch, Frank Tutas, Nicholas Minnelli, Frank Baum, Hamer Curliss, Raffaele Infarzato, Carl Grammel, J. D. Judge, Donald McDaniel, Louis Dunlap, Allen Moore, William Koch, Herman Mount, Karl Hepting, Albert Frazee, and Peter E. Rentschler, president. Mr. Nickel, the company's oldest supervisor in point of service, presented the pin to Mr. Rentschler. Mr. Dunlap, Mr. Koch and Mr. Mount are retired.

Approximately one-third of the Hamilton employees have been with the company five or more years.

Open New Offices

Link-Belt Co., Chicago, has opened three new sales offices. M. J. Parykaza has been appointed district sales engineer in charge of a new office at 1608 Fifth Ave., Moline, Ill. Mr. Parykaza, with the company since 1922, has been handling the Moline territory out of Chicago since 1944. A new office at 730 Temple Bar Bldg., Cincinnati 2, has been put in charge of L. R. Clark, district sales engineer, who has been with the company since 1927, and has been serving the Cincinnati territory out of Indianapolis for the last six years. C. C. Wiley has been appointed district sales engineer in charge of a new office at 823 Comer Bldg., Birmingham. Mr. Wiley, with the company since 1926, has spent 17 years in the Pittsburgh sales organization.

Peter E. Rentschler, Hamilton president, addressing employees at service award ceremonies. Men with service records of 25 or more years are seated at the tables

Osborn JOLT SQUEEZERS

For steady, dependable use in production or job foundries—Osborn Jolt Squeeze machines work easier and faster with less maintenance. Here's a typical installation which is delivering uninterrupted, high production today.

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue Cleveland, Ohio

STAND THE GAFF!

OSBORN

MOULDING MACHINES

MEMBER

MANUFACTURER'S ASSOCIATION, INC.

FOUNDRY EQUIPMENT

Around DETROIT

By A. H. ALLEN
Detroit Editor, The Foundry

Limping pace of automotive casting suppliers is in keeping with delays in production of other parts. . . . Scrap tight, pig iron more plentiful. . . . Two foundries change hands

LOCAL scrap broker, bewailing his inability to satisfy snowballing demands for iron and steel scrap material, said the other day if he were to repeat all the names he had been called by foundrymen in recent weeks he would make the toughest truck driver sound like a Sunday school teacher. Epithets, of course, do not bring out any scrap and when this individual was queried as to how foundries are scraping together sufficient old metal to keep going he replied that he did not known but "maybe there was a little chiseling"—like "writing out tickets for 12-ton loads when 6-ton loads were received."

Such black markets in foundry scrap are probably few in number, because it takes more than price to bring out the material. What is happening is that melters are just having to adjust operations to the limit of available scrap, pig iron and coke, and call it a day. By mid-June it appeared the worst of the coal strike effect was over, and by the time this appears in print pig iron shipments will have been resumed in something like normal volume. There were many close calls resulting from the pig iron drouth, the large Pontiac gray iron foundry, for example, having come within a few hours of forcing a complete shutdown of the division's auto manufacturing operations.

Outside Strikes Halt Production

Serious though the situation is, there are so many other shortages and interruptions to the flow of supplies to motor plants that the limping pace of castings manufacture does not show up too critically. Thus, the General Motors divisions took a tally a few weeks ago and counted over 300 suppliers tied up by strikes, or, eliminating duplications between divisions, about 140 different vendors in all. Ford has been throttled by inability of 45 suppliers to make shipments and, after closing on May 15, finally was able to resume assemblies on June 24. Ford foundry divisions also were closed for the period, starting up again on June 11. Nash was closed for two weeks because of unsettled parts supplies. Other producers have been faltering along on the ragged edge. Results have been that automobile assemblies dropped from their April peak of 70,000 weekly to a low of around 32,000 at the end of May. Last month they started creeping back, and there is a glimmer of hope that this month may see the industry on a renewed drive to the 100,000-weekly level prevailing in 1941.

• • •

BRIEF discussion of Wilson Foundry & Machine Co., Pontiac, appearing in this department last month was compiled because of what appeared to be a well-founded report the company was about to be purchased outright by Willys-Overland in Toledo. When queried directly, an officer of the company denied the impending transaction, but a few days later the official confirmation of the deal was released from Toledo, which goes to show the difficulties an editor often encounters. At any rate, Willys is paying $3,700,000 for the Wilson plant, with funds to be raised from a forthcoming stock issue, plans being approved by stockholders on May 29. In all, about $21,000,000 is to be spent on expanding the Willys plant for production of 300,000 cars annually. Close to $17,000,000 is earmarked for land, buildings and equipment at Toledo, including an impressive new body shop with the latest word in presses and manufacturing equipment.

Willys plans to introduce shortly an entirely new line of 6-cylinder passenger cars, with engine components to be supplied by Wilson Foundry and subsequently machined and assembled, at least at the start, by Hupp Motor Car Corp. in Detroit. The unit is described as giving 70 brake horsepower at 4000 rpm, in contrast with the present 4-cylinder jeep engine which delivers 60 hp at the same speed. Inference is that bore and stroke will be somewhat smaller, since the engine has two more cylinders but delivers only 16 per cent more power.

The ambitious program drawn up for this Toledo manufacturer comes on the heels of the association of former GM Overseas Division chief James D. Mooney as top executive and the transfer of several other high GM officials to his new staff. Included are Walter D. Appel, who will have charge of product development, and Claude Crusoe, who headed Fisher Body purchasing for 15 years. C. E. Sorenson, who joined Willys as president shortly after his retirement from the Ford organization, has remained in the background in the latest Willys reorganization and reportedly is content to be production manager.

• • •

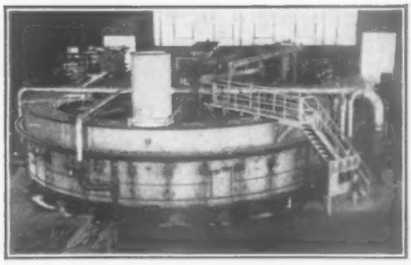
RECENT death of S. Wells Utley, president of Detroit Steel Casting Co., following upon the earlier retirement of F. A. Melmoth, vice president and general manager, left serious gaps in the managerial and ownership ranks of the company, and its affairs have been somewhat unsettled until a few weeks ago. Principal owner was the estate of the late Phelps Newberry which was of course removed from the operating management, leading naturally to the decision to sell the plant. A few months ago a local tool and die manufacturer made an offer to buy the foundry, but it was not accepted. Later a group organized by the operating management made another offer which seemed likely to be accepted. Finally, however, the Barium Steel Corp. of New York stepped in with an offer which now has been accepted.

Has Widespread Interests

Barium Steel Corp., 60 Wall St., New York, is a holding company of which J. A. Sisto is chairman and Rudolph Eberstadt, brother of Ferdinand Eberstadt, is president. Its subsidiaries include Barium Steel & Forge Inc., Canton, O., Clyde Iron Works Inc., Duluth, Minn., Erie Bolt & Nut Co., Erie, Pa., Globe Forge Inc., Syracuse, N. Y., Central Iron & Steel Co., Harrisburg, Pa., Kermath Mfg. Co., Detroit and Toronto, Ont., Geometric Stamping Co., Cleveland, and Republic Industries Inc., New York, the latter a holding company with wholly-owned subsidiaries including Jacobs Aircraft Engine Co., Pottstown, Pa., Por-

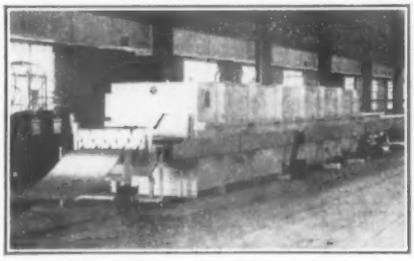
(*Concluded on page* 136)

Copper Brazing Heavy Assemblies. An EF roller hearth furnace copper brazing heavy steel assemblies. Other types are handling aluminum, brass, and steel assemblies ranging from small radio tube parts up to large automotive and aircraft units. Information on furnaces and brazing process available from The Electric Furnace Co., Salem, Ohio.



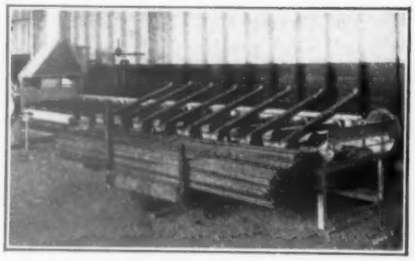
Heats 35,000 lbs. Billets Per Hr. Billets up to 10″ x 32″ are uniformly heated in this large EF oil fired rotary hearth furnace. Has hydraulically operated charging and discharge mechanism. Other EF rotaries available for various processes; in sizes ranging from 250 lbs. per hr. up. Write The Electric Furnace Co., Salem, Ohio, regarding your requirements.

Scale Free Annealing Castings. 40,000 lbs. of castings per day are annealed, scale-free, in the above EF continuous special atmosphere short cycle annealing installation. Larger or smaller continuous, semi-continuous and batch type electric or fuel-fired furnaces also available. We solicit your inquiries. The Electric Furnace Co., Salem, Ohio.

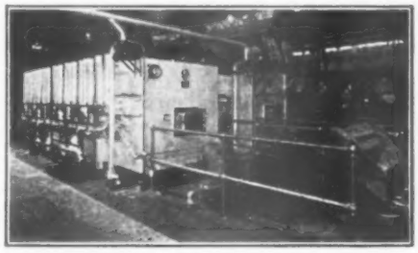


Bright Annealing Strip — Continuously. This EF furnace handles single or parallel strands up to 36″ wide. Advantages include uniform finish and anneal; quick deliveries; short annealing time; less material in process. Available for annealing hot or cold rolled; high or low carbon; stainless and non-ferrous. The Electric Furnace Co., Salem, Ohio.

For Heat Treating Large Castings. Railroad castings, heavy tank castings and other large parts and products are annealed, or heated and quenched in EF units similar to the above. Other types include roller hearth, roller rail, pit, car, and other designs; electric or fuel fired. Built by The Electric Furnace Co., Salem, Ohio.

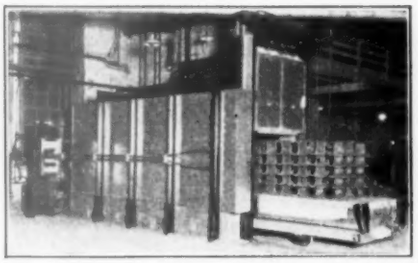


For Bright Annealing Tubing. Discharge end of an EF continuous special atmosphere furnace bright annealing 40,000 lbs. steel tubing per day. We build other sizes and types; electrically heated or fuel fired; for ferrous and non-ferrous tubing. Additional information furnished on request. The Electric Furnace Co., Salem, Ohio.

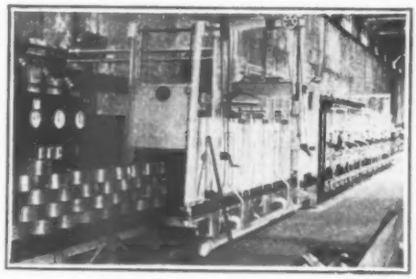


For Scale Free Hardening Small Parts. 175 to 2000 lbs. of small and medium size parts and products, per hour, are scale-free hardened in EF continuous chain belt furnaces such as shown above. We build them either electrically heated or fuel fired. Send for data on sizes to handle your production. The Electric Furnace Co., Salem, Ohio.

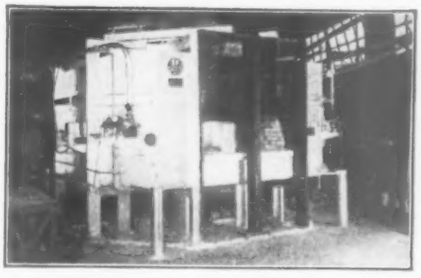
For Sintering Powder Metal Parts. Pressed metal powder products are sintered, continuously, in EF special atmosphere furnaces similar to above. This furnace handles 800 lbs. of parts per hour. Other EF installations are fusing powder metal on strip, etc. Designed and built by The Electric Furnace Co., Salem, Ohio.



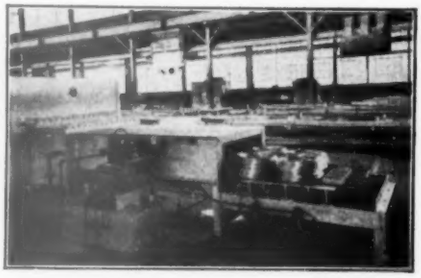
Car Type Furnaces. For annealing castings, bar stock plates; stress relieving welded structures; heat treating armor plate, etc. The above furnaces is annealing steel castings. We build them either electric or fuel fired in sizes to handle any size product or for any size charge. The Electric Furnace Co., Salem, Ohio.



For Annealing Strip in Coils. Above installation anneals 10,000 lbs. non-ferrous strip per hour. Other EF furnaces are bright annealing steel strip in coils; uncoiled strip, continuously; also tubing, stampings and other products in various shapes and forms. Send for data on equipment to handle your requirements. The Electric Furnace Co., Salem, Ohio.



For Heating for Forging, Heat Treating, etc. We have built various sizes and types of rotary furnaces for heating billets for rolling, extruding, etc.; heating for forging and other heating and heat treating processes. We build them for oil, gas or electrically heated. We solicit your inquiries. The Electric Furnace Co., Salem, Ohio.



For Bright Annealing Wire. Ferrous and non-ferrous wire and rod, on large reels, small spools or in coils are bright annealed or normalized in EF continuous and batch type furnaces. Above furnace anneals both wire and strip. We build them in sizes and types for any requirement—electrically heated or fuel fired. The Electric Furnace Co., Salem, Ohio.

NONFERROUS FOUNDERS

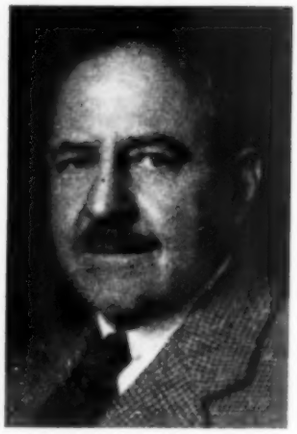
Hold Annual Meeting

AT THE conclusion of the Non-Ferrous Founders' Society annual meeting held in Cleveland, May 6, Thomas S. Hemenway was elected president of the organization for the administrative year 1946-47. Mr. Hemenway, president of Metal & Alloy Specialties Co., Buffalo, has served on both the executive committee and the board of directors of the society, and previously had been vice president after heading up the membership committee.

L. M. Nesselbush, vice president, the Falcon Bronze Co., Youngstown, was elected vice president of the society. Likewise a member of the board of directors and the executive committee, he had been chairman of the cost committee for several years.

Retiring President E. W. Horlebein, the Gibson & Kirk Co., Baltimore, remains as a director and was re-elected to the executive committee.

In his annual report, President Horlebein brought out the healthy progress made by the society during the past administrative year. Membership increased 48 per cent. "This growth has been made through extremely troublesome times and during a period when both the country and the industry passed from one crisis to another," he reported. Paying a tribute to his predecessors, he stressed the formative period of the society in the early war days when the executive officers had to maintain almost constant contact in Washington in order to maintain an even flow of materials.



THOMAS S. HEMENWAY
President
Non-Ferrous Founders' Society

Mr. Horlebein, as chairman of the OPA Industry Advisory Committee, summarized the progress to date concerning possible "across the board" price relief because of the increased wage picture.

"Our new regional chapter expansion is making splendid progress," he stated, "with local bodies well organized in the East and Middle West. Within a short time we will carry this program out to the West coast."

A. E. Pye of Chicago was re-elected secretary-treasurer and H. J. Evans as assistant secretary-treasurer.

All committee reports were approved, and plans made for greater activities during the coming year. Seven directors were elected for three-year terms, to fill expiring vacancies in seven areas:

John L. Gerber, Bronze Die Casting Co., Pittsburgh; William D. Goldsmith, C. A. Goldsmith Co., Newark, N. J.; J. J. Nelson, Cramp Brass & Iron Foundries, Division of Baldwin Locomotive Works, Philadelphia; W. E. Paulson, Thos. Paulson & Son Inc., Brooklyn, N. Y.; Charles S. Parker, Charles Parker Co., Meriden, Conn.; Thomas W. Pettus, National Bearing Metals Corp., St. Louis; E. H. Tibbetts, Wollaston Brass & Aluminum Foundry, North Quincy, Mass.

L. H. Durdin, Dixie Bronze Co., Birmingham, was appointed to replace Charles Wegelin of that city, who had resigned from the board.

(*Concluded from page* 134)

celain Steels Inc., Cleveland, and Perma-Jack Corp., Cleveland.

Under arrangements concluded June 3, Barium Steel purchased all stock of Detroit Steel Casting Co. from a group which had previously acquired the holdings. James M. Duncan continues as president and J. R. Burgess as secretary and treasurer. Other key personnel also will remain, Laurance V. Savage, works manager of Hartford Electric Steel Corp., Hartford, Conn., becomes works manager on July 1, and Henry N. Wheeler, formerly of the Hartford company, sales manager at about the same time. Board of directors includes Messrs. Duncan, Burgess, Frank Donovan, J. A. Sisto, Rudolph Eberstadt, Jules Breuchaud and R. C. Hardy.

Detroit Steel Casting was founded in 1888 as the Detroit Steel & Spring Co., being incorporated in 1902 under the present name following the expansion of the plant and construction of a laboratory and producing facilities to supply heavy railroad, steamship and machinery castings. Present facilities include two 20-ton acid open hearths, a 3000-lb electric furnace and related equipment such as pattern shop, physical, chemical and sand testing laboratories. The plant covers 7¼ acres and adjoins the property of Cadillac Motor Division on Detroit's west side. New plans call for the purchase of certain labor-saving machinery and equipment, the installation of another 5—7-ton electric furnace and other improvements. Unfilled orders on hand at the close of May were sufficient for more than six months of operation.

• • •

RESHUFFLING of top administrative personnel in General Motors probably will have little effect on operating departments except to concentrate their direction more in Detroit under C. E. Wilson, president. The Chevrolet Division has a new general manager, Nicholas Dreystadt, formerly in charge of Cadillac, succeeding M. E. Coyle; no change is announced in the light car division which comes under supervision of Arnold Lenz.

• • •

IT GOES without saying that research on foundry problems will be an important part of activity in the elaborate new $50 million engineering center on which Ford Motor Co. will begin construction as soon as government approval can be obtained and materials provided. The center will combine all the scattered research activity of the various Ford plants in a central group of buildings grouped about a 7-acre lake on a 500-acre site of land adjacent to Dearborn Inn and across from the Ford airport. The project will require eight years for completion, but meanwhile the Ford engineering and research staff is being enlarged steadily, moving toward a level of 3000, exclusive of plant research, and chemical and metallurgical research. R. H. McCarroll, executive engineering director, is supervising the activity.

• • •

IT IS expected much more will be heard of the permanent mold cast aluminum bearings for automotive engines, first technical details of which have been released by Aluminum Co. of America. Automotive engine experts have been discussing them for some time and see particular advantages in economy, resistance to corrosion, high fatigue strength, low shaft wear, etc.

St. John X-ray Laboratory has moved its facilities to its own building located at Califon, N. J. Herbert R. Isenburger is president.

TWO MEXICAN GRAPHITE PRODUCTS THAT WILL INCREASE PROFITS AND QUALITY IN YOUR FOUNDRY

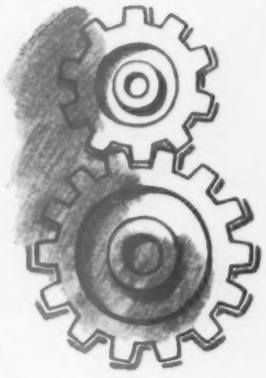
MEXITE BRIQUETTES

SAVE PIG IRON COSTS

Weighing only 4 lbs. each and yielding as much graphitic carbon as 50 lbs. of pig iron, Mexite Briquettes help reduce melting costs by allowing the use of more cheap scrap. Mexite is put in with the steel in high steel charges, and in coke splits when using 100% scrap. Twenty Mexite Briquettes thrown in below the tuyeres when making up the coke bed and four introduced with each ton of metal charged will hold the carbon closer to specifications and act to replace 200 lbs. of pig iron per ton of charge with normal operation.

NO. 8 MEXICAN GRAPHITE

SAVES MACHINING COSTS



If you are pouring light sections and want good machineability, low hardness, and no chilled edges, add 2 lbs. of No. 8 Mexican Graphite to each ton of metal, or less, by trickling at the spout or tossing into the ladle while filling. At a cost of less than 10c per ton, No. 8 Mexican Graphite eliminates the need for annealing and reduces cleaning room and machine shop expense. Write for full information and metallurgical assistance in increasing profitable production in your foundry with Mexite Briquettes and No. 8 Mexican Graphite.

THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICHIGAN

Foundry DEVELOPMENTS

NEW application of shot peening which appears to show promise is its use in salvaging some die-cast aluminum alloy parts which leaked under pressure. Pieces are shot-peened on both sides in a rotary type, multi-table machine—first on one side and then on the other. All castings are subjected to 50 psi air pressure, and some were hydraulically tested at 1000 and 2000 psi, giving 90 per cent without leakage and only a slight seepage in the remaining 10 per cent.

* * *

NEOPRENE, a synthetic rubber produced by the DuPont company now is being formulated with aluminum oxide abrasive into tiny resilient pellets which are used in tumbling barrels to smooth and polish castings, precision-machined parts, metal stampings, etc. The synthetic rubber composition serves as a cushioning agent and matrix for the abrasive. Cushioning effect separates parts being finished especially those with easily damaged threads, serrations, or those of the softer metals. The rubber also is claimed to supply a flexible backing for the abrasive insuring constant even honing pressure and permits penetration into threads, serrations, etc. The pellets are said to wear into small pieces and remain useful until completely worn down.

* * *

INDUSTRIAL expansion during the war resulted in the vastly increased use of x-rays and radium in the examination of materials and manufactured products. At the same time considerable progress was made in the use of high voltage x-rays. To eliminate the hazards inherent in the common routine use of such equipment, the American Standards Association has prepared a Standard Safety Code for the Industrial Use of X-Rays under the designation Z54.1-1946 which comprises 60 pages. First part of the code deals with general protection while the other five are concerned with use and storage of radium, methods and materials of x-ray protection, specific applications for 400 kv and lower, protection for voltages of one and two million, and electrical protection.

* * *

DESIGNED especially to aid the industrial, scientific or medical photographer a new pamphlet entitled "Plans for Darkroom Workbench and Sink Units" has been published by Eastman Kodak Co., Rochester 4, N. Y. It gives pertinent points for construction of wet and dry units which are designed to make cleaning as simple as possible and to eliminate dirt-catching contructional features. Planned to provide versatile accommodations for processing moderate amounts of photographic materials, the units may be built in any woodworking shop and moved to the desired location.

* * *

COMBINATION gasoline blow torch and soldering iron developed by the Germans and described by the US Army Engineer Board as a practical dual purpose tool is discussed in a report released by the Office of Publication Board, Department of Commerce (PB-11497; photostat, $1). Burner head is of common design with fuel tank forming handle of torch. Soldering copper is fastened to top of torch and held in flame with a sheet metal guard concentrating the heat. Without the soldering iron attachment the tool becomes a good blowtorch with a fuel capacity of ½-pt. Tool is said to be light in weight and easy to handle. E. B.

◆

DOING the seemingly impossible—nailing identification tags to cold ingots of the hardest steel—is an accomplished fact at the South Chicago Works, Carnegie-Illinois Steel Corp. Not only can nails be driven into cold steel, but it can be done with little effort. A 2¾-lb hammer with a simple spring attachment to hold the specially heat-treated, ¼-in. nail and metal tag bearing the heat number is all that is required. Exceptional physical strength on the part of the hammer wielder is not needed. Originally conceived at one of the corporation's eastern plants several years ago, the idea was not tried at the South Chicago mill until recently. Nailing the tag to the ingot makes identification speedier and more permanent than the previous method of using special paint.

◆

3 REASONS WHY....

CROWN HILL SEACOAL *brings repeat orders*

1 Sudden and complete ignition. Processed from the very finest coal, its qualities are such that it is utterly consumed in a flash. The insignificant ash residue is so trifling it couldn't be measured outside a laboratory.

2 Low sulphur content. All coal contains sulphur in varying degrees, but CROWN HILL SEACOAL contains a remarkably low amount of this element. This low percentage insures cleaner iron and smaller ash.

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CONGRESS SESSIONS RECOUNT FOUNDRY DEVELOPMENTS

(*Continued from page* 113)

gan, Ann Arbor, Mich., presided. Speakers included J. E. Goss, Brown & Sharpe Mfg. Co., Providence, R. I., and Ralph L. Lee, General Motors Corp., Detroit.

Subject of Mr. Goss' discourse was "Means To Produce Skilled and Leadership Personnel" and as an introduction he pointed out that apprenticeship has received attention by the AFA almost from its inception—the first committee presenting a report in 1897. To provide material from which skilled and leadership personnel can be trained, it is necessary to maintain a system of public relations whereby the public can be informed of the advantages of foundry work. That information should not paint a rosy picture but present the facts.

In selection of boys for apprentice training it is wise to use some type of pre-employment test to ascertain mental capacity, personality traits and interest. The apprentice training program should be carefully thought out to provide a full training, and to show the prospective trainee exactly what phases are covered. Training should be such that the graduate can go to another foundry doing the same type of work and carry on. Management must maintain a close relationship with the training program if it is to be successful. Short term training, while useful, does not lead to an all-around training necessary to provide skilled and leadership personnel.

Mr. Lee chose as his topic "Adventure in the Foundry," and pointed out that the actual desire to learn is more important than the method of passing on know-how, and if some method were available to ascertain the desire in the prospective apprentice, one could be sure that he would pursue the studies with deligence. Mr. Lee gave Webster's definition of adventure as "a bold and dangerous enterprise; a risky undertaking; a remarkable experience; a business undertaking," and stated that he did not know of any field where the terms applied more than in the foundry industry. He then expanded each of the meanings of the definition as applied to the foundry —sometimes humorously and other times seriously. In closing, he said that since the casting begins on the drawing board, close co-operation is needed between designer, patternmaker and foundryman to produce the best possible results.

COST CONTROLS

Are More Important

WHILE there was a letdown in cost control during the war, a livelier interest is now being manifested and such attention is increasingly necessary if many foundries are to operate on a profitable basis, A. E. Grover, cost consultant, Cleveland Heights, O., declared at a session devoted to a discussion of foundry costs. He looked for increasingly close competition as time goes on and urged all to check their cost accounting systems, with a view to placing them on a thoroughly sound basis.

R. L. Lee, Grede Foundries Inc., Milwaukee, presided with L. M. Nesselbush, Falcon Bronze Co., Youngstown, O., serving as co-chairman. The session had an over-flow attendance and was marked by much discussion from the floor following presentation of Mr. Grover's address.

Declaring that dependable results can never be obtained by adding unrelated elements, Mr. Grover analyzed various phases of the cost control problem and described at length the different elements than go to make up fixed and variable expenses, illustrating his remarks with lantern slides. He emphasized that the cost problems of small foundries are the same as large, and that their solutions are the same, provided they are engaged in producing the same type of castings. He warned against placing too much reliance on average costs over past years, declaring that today's situation may be different and that unless costs are based on current normal operations, conclusions will prove unsound.

A breakfast session sponsored by the Foundry Cost Committee included a discussion of the small shop cost system by committee members.

PATTERNMAKING

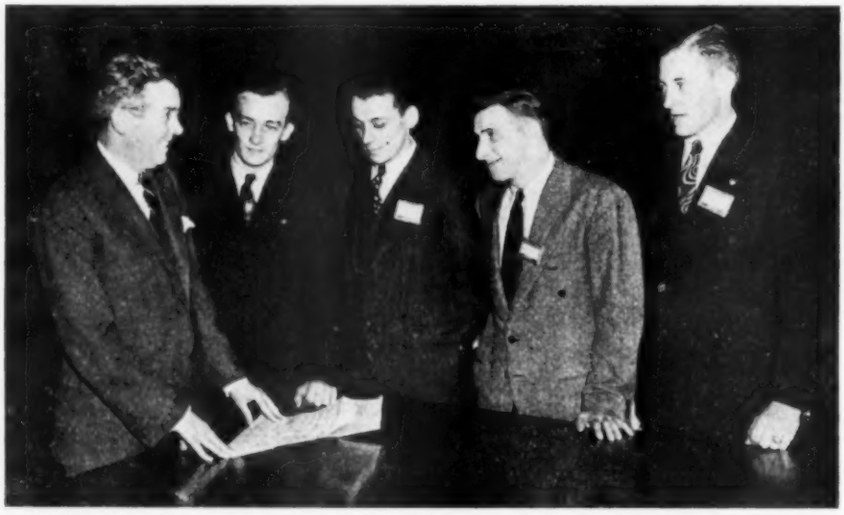
Subjects Interesting

A LARGE and interested audience of young and older foundrymen attended the session devoted to discussion of patternmaking. Frank C. Cech, Cleveland Trade School, Cleveland, presided, with, V. J. Sedlon, Master Pattern Co., Cleveland, serving as co-chairman.

In discussing the use of wood models in planning and design, G. W. Schuller, Caterpillar Tractor Co., Peoria, Ill., explained that many errors in design are due to lack of visual power and inability to see the processing in every function and detail, from a study of blueprints. Wood models eliminate this difficulty, and from them cross sections, pipe bends, and depth detail, not clear on the drawing may be discerned.

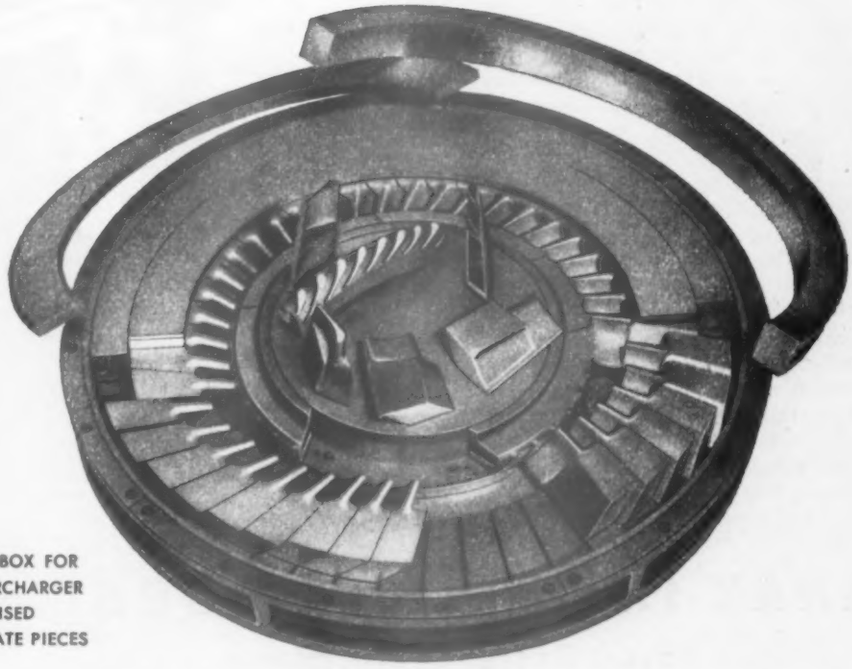
Wood models are advantageous as they are easy to work, to change and to model. The patternmaker, who is an engineer, designer and machinist, is the logical one to execute the work. The engineering department usually requests the model, although the foundry department and pattern departments use them to splendid advantage. The speaker mentioned that wood models are sometimes made to full scale and sometimes in miniature and can be used to study interiors of jobs, parts of jobs, or core contours. Mr. Schuller used slides to illustrate the effectiveness of models for studying and changing design of cylinder

(*Continued on page* 142)



APPRENTICE WINNERS: Four winners in the annual AFA apprentice contest are congratulated by Cleveland's mayor, Thomas A. Burke. Left to right: Mayor Burke; Robert Bina, Crucible Steel Casting Co., Cleveland; C. Corriveau, Montreal Technical School, Montreal, Que.; R. Dragon, Western Pattern Works, Montreal; Lawrence Kinsinger, Caterpillar Tractor Co., Peoria, Ill.

TURBO-SUPERCHARGER DIAPHRAM



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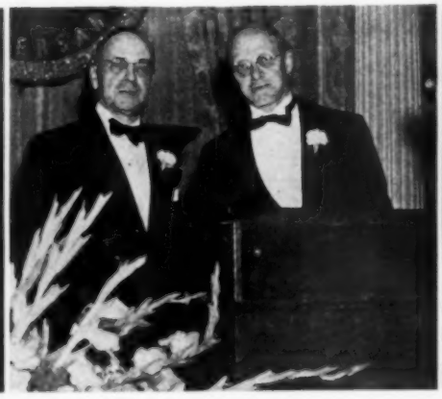
AFA AWARDS: Presentation of annual awards at 50th Anniversary Convention dinner. *Left*—Max Kuniansky presents the William H. McFadden Gold Medal to Hyman Bornstein. *Right*—H. S. Simpson awards the Peter L. Simpson Memorial Medal to H. F. Taylor. *Below left*—L. N. Shannon presents the John H. Whiting Gold Medal to Peter Blackwood. *Below center*—R. J. Teetor awards an honorary life membership to H. J. Roast. *Below right*—In the absence of W. J. Coane, Dr. G. H. Clamer accepts the honorary life membership awarded the former, from L. C. Wilson



(*Continued from page* 140)

heads, assembly planning and molds. Discussion from the floor proved that the use of wood models, while expensive in many instances, is beneficial when overall expense of the job is considered.

In his discussion of patterns as the production foundry sees them, Guy Pealer, Elmira Foundry Co. Elmira, N. Y., traced development of patternmaking from its beginnings to present-day use. Foundries are concerned with various problems in connection with pattern use, including exact requirements of metal specifications which involve shrinkage, exactness of size and shape, competitive cost, and delivery date to be met. A good engineer should thank the patternmaker for suggested changes.

In discussing cost, the speaker said that the cost of patterns is a small item in the overall cost picture. In the production of patterns, consideration of flasks on hand and the possible need for matchplates are involved. In consideration of delivery date, production and mechanization of equipment must be faced. Requests for quotations should be referred to a planning department to decide which department will do the job. Core, pattern and mold supervisors should be called in to figure respective costs, which should be given to the casting department. The patternmaker should be encouraged to criticize the job requirements and offer suggestions. Cores cost real money and may be a bottleneck. Discussion from the floor brought up the matter of proposed changes in standard color charts for pattern. Mr. Cech stated that this was to be referred to the AFA for consideration and action.

GRAY IRON SHOP COURSE

Covers Operating Procedures

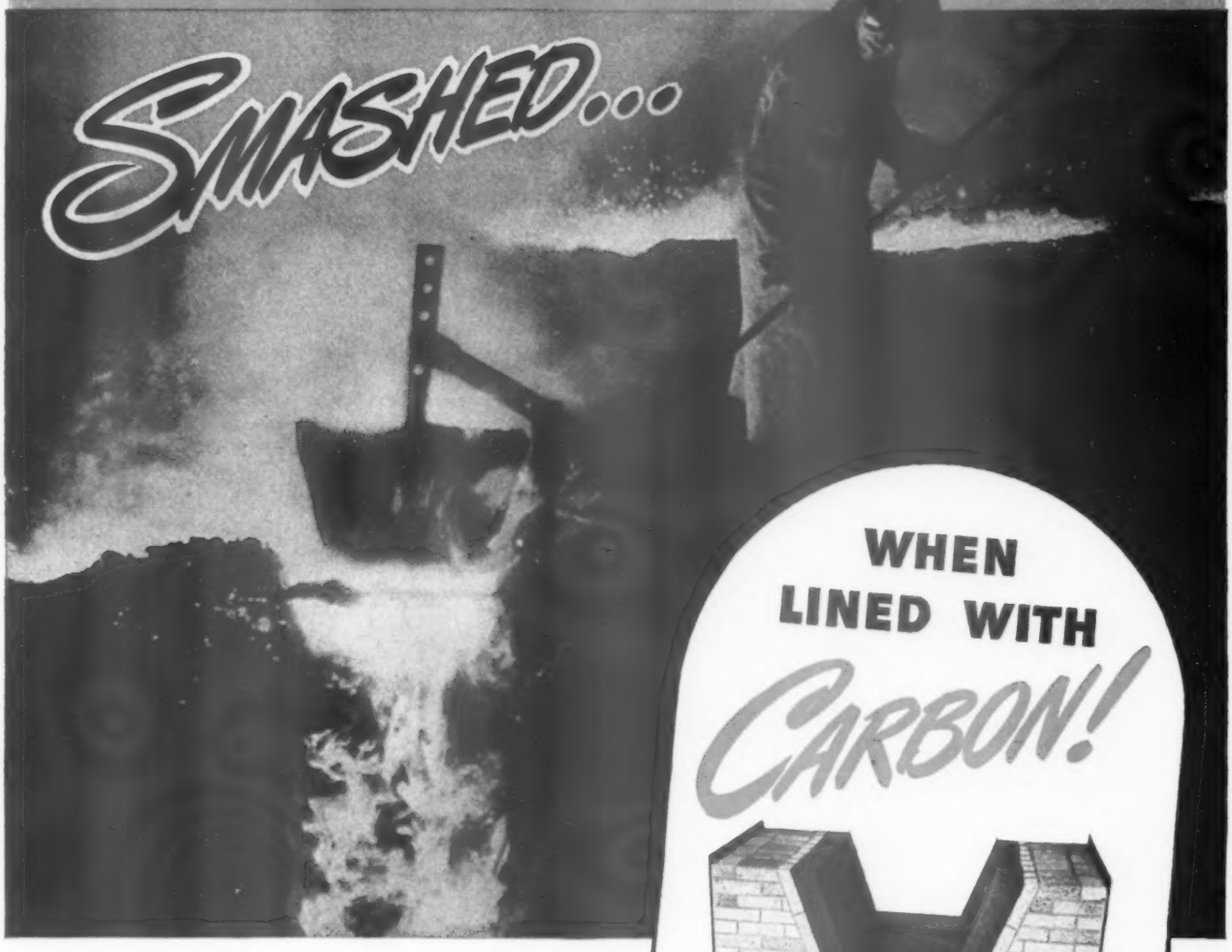
FIRST of four sessions comprising the Gray Iron Shop Course was held under the direction of George A. Timmons, Climax Molybdenum Co., Detroit, and P. T. Bancroft, Republic Coal & Coke Co., Moline, Ill. Subject of the meeting was the metallurgy of cupola mixes, and the discussion leader was Kenneth H. Priestly, Eaton Mfg. Co., Vassar, Mich. He pointed out that important items in cupola mixes are the type or types of castings to be made, whether the iron is a high strength or plain type, the availability of raw materials and the labor supply.

For best results it is necessary to have good cupola supervision and to see that materials are weighed properly, using scales of suitable sensitivity for accurate weighing of small or large additions. Mr. Priestly discussed the value of keeping a cupola log sheet, and described the procedure for determining the weights of various elements in the cupola charge. He stressed the need for accounting for the amount of carbon charged, since it can be adjusted and controlled. Other phases of cupola mixes discussed included size of material to be charged in relation to cupola diameter, charging methods, cupola slags, possibility of heredity from previous manufacture following through cupola melting, etc.

Casting defects attributable to metal were discussed at the second Gray Iron Shop Course session, presided over by George Anselman, Geobig Mineral Supply Co., Chicago; and W. B. McFerrin, Electro Metallurgical Co., Detroit. Attention was directed to the work of the AFA committee which initiated a movement toward the publication of a book listing all possible causes of defective castings and the proper methods of prevention. Obviously the project entailed a tremendous amount of work. Appreciation was expressed for the co-operation shown by all the sources of information. The work is not yet completed, but the committee reports excellent progress. With constantly changing conditions in the methods and equipment employed in the production of castings, it is probable that corrections and additions will have to be added as occa-

(*Continued on page* 144)

SERVICE RECORDS FOR RUN-OUT TROUGHS



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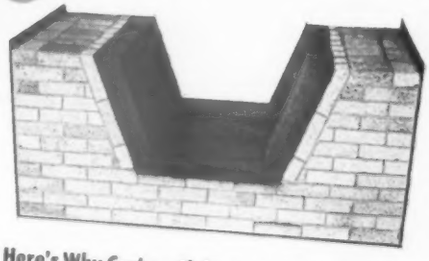

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(*Continued from page* 142)

sion may arise.

The AFA Committee on Analysis of Casting Defects was organized in 1940 with W. A. Hambley, Allis-Chalmers Mfg. Co., Milwaukee, as chairman. This company generously placed its extensive facilities, photograph department, physical and chemical laboratories and the time and effort of its technical staff at the disposal of the committee.

Work of the committee up to the present has been presented in papers read before several AFA chapters the past few years. Stress was laid on the fact that an almost universal human failing prompts foundrymen to place the blame for defective castings on defective materials, when in reality the materials may be first class in every respect. The fault lies in the treatment the material receives, before and during passage through the foundry.

Features covered in the book include design, patterns, flasks, melting, pouring, gates and risers and many others which directly or indirectly are the cause of defective castings. A general breakdown of all features will serve as a guide, particularly in cases where the origin may be obscure, or where a number of factors may be involved. The speaker showed several slides illustrating this feature.

Discussion of the subject of casting defects attributable to metal was continued over to the third session of the gray iron shop course the following day.

Fourth session of the course dealt with the metallurgy of carbon control in the cupola. The subject was introduced by Ralph A. Clark, Electro Metallurgical Co., Chicago, in a comprehensive paper summarizing the views of various investigators and incorporating his own. Good general discussion followed. A complete article on this subject by Mr. Clark appeared in THE FOUNDRY for June.

Mr. Clark emphasized that coke is the most important material going into the cupola. In discussion, a spokesman from Battelle Memorial Institute pointed out that neither coke producers nor cupola operators know what is the best coke size. Little investigation has been conducted on this matter and he suggested that some work along this line would not be difficult and would be most welcome.

DISCUSS OPPORTUNITIES

For Engineering Graduate

A SESSION on Engineering Student Training, sponsored by the Committee on Co-operation with Engineering Schools, brought out varied suggestions concerning the problem of interesting the engineering graduate in entering the foundry industry. This meeting followed the committee's annual foundry instructors' dinner, at which P. E. Kyle, Massachusetts Institute of Technology, Cambridge, Mass., presided. The ensuing session had George J. Barker, University of Wisconsin, Madison, Wis., as chairman and Clement J. Freund, University of Detroit, Detroit, as co-chairman.

A panel discussion on the subject "College Graduates vs. Employers" was opened by A. S. Kromer, Wolverine Tube Division, Calumet & Hecla Consolidated Copper Co., Detroit, who spoke from the engineering graduate's viewpoint. He stated that too many foundries are reluctant, for various reasons, to make use of college graduates, despite the fact the industry's technical requirements are similar to those of various other industries which actively seek college-trained men. Mr. Kromer mentioned various advantages inherent in employing the technically trained graduate. These include the fact that the latter has demonstrated he can finish a four-year job; he has been furnished the incentive to keep abreast of technical developments; he is able to learn faster and has has been trained in orderly thinking.

Some of the objections occasionally raised by foundries to the employment of college graduates are that such men have no practical experience and are unwilling to learn; they expect to be vice president within two years, and they expect too high a salary. These objections, Mr. Kromer stated, are not applicable except in rare instances. He urged foundries seeking college graduates to use experienced interviewers in attempting to obtain such employees. He also stated that college graduates in the foundry frequently are trained too slowly and that they should be given responsibilities more rapidly in order that they may be kept busy.

Dean Clement J. Freund, College of Engineering, University of Detroit, and Prof. George J. Barker, Mining-Metallurgy Department, University of Wisconsin

Speaking from the standpoint of the foundry manager, William J. MacNeill, Dayton Malleable Iron Co., Dayton, O., declared that the foundry industry offers opportunities to college graduates which are matched by few other industries today. Foundries have been proved basic and fundamental in our economy, and the young man entering the industry will encounter relatively little competition. The man who comes in with his sleeves rolled up ready to go to work can almost write his own ticket, Mr. MacNeill pointed out. Actual training of the new men necessarily must vary with the type of foundry, the important consideration being thorough grounding of the individual in fundamentals.

Must Sell Itself

The third speaker, A. L. Stewart, Allis-Chalmers Mfg. Co., Milwaukee, declared that the job of selling the foundry's opportunities to the college graduate rests upon the industry itself. In the past the wrong approach frequently has been used in stressing the unfavorable side of foundry employment, particularly on the part of the colleges. He recommended the starting of new men at the bottom and weeding out those who showed they are not actually interested in a foundry career.

In subsequent discussion, Prof. Kyle pointed out that many graduates have been trained to fill positions in the foundry industry but have been attracted elsewhere. Both he and other commenters indicated that the colleges alone cannot be expected to guide graduates into the foundry industry. Prof. Barker described a plan followed at the University of Wisconsin in which 16 men of top rank in the foundry industry gave weekly lectures to foundry students at the school. The Wisconsin Chapter of the AFA cooperated in the sponsorship of this plan.

A meeting of the Committee on Cooperation with Engineering Schools, held during the convention, disclosed progress in the various plans being formulated by this group in attempts to derive more benefit for the foundry industry from opportunities offered by co-operative planning with the various engineering colleges. It is expected that this program will be ready to be inaugurated fully the latter part of this year.

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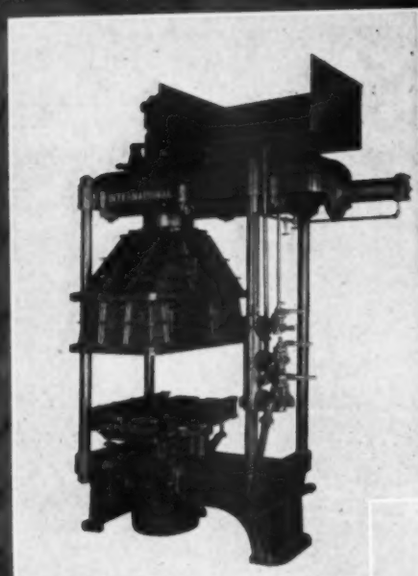

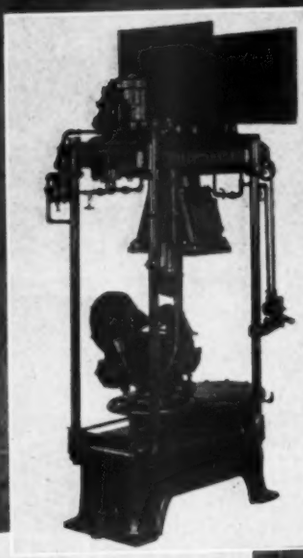

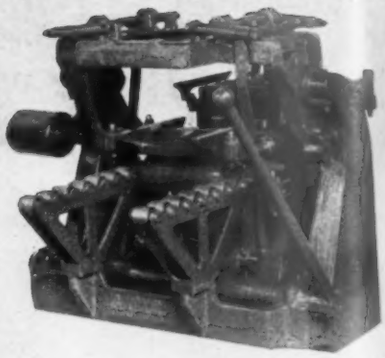

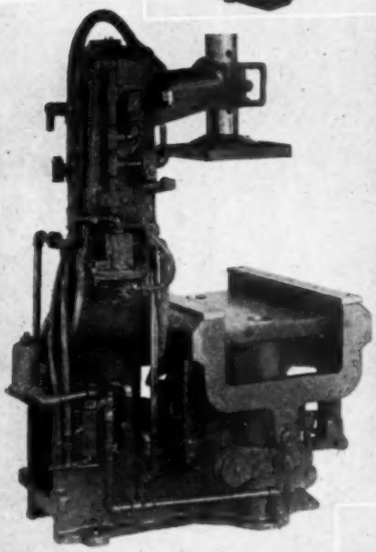

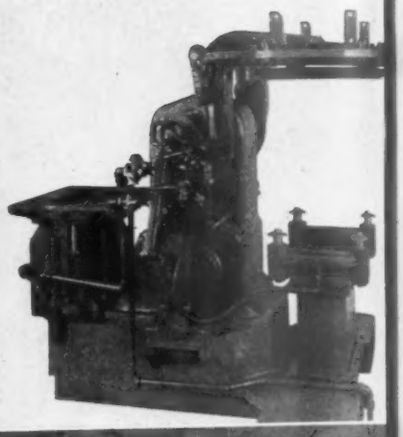

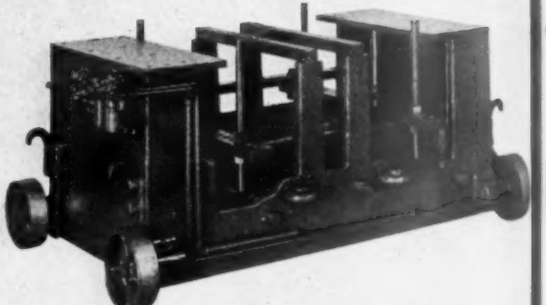

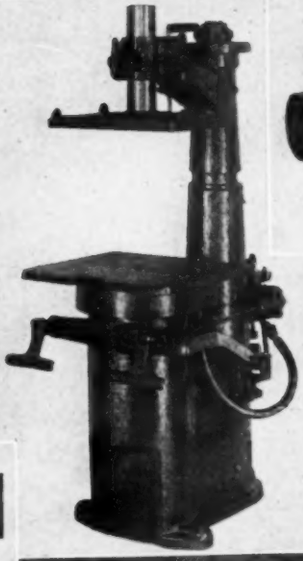

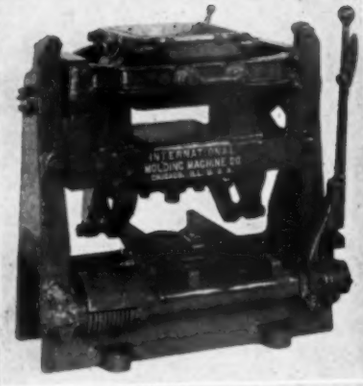

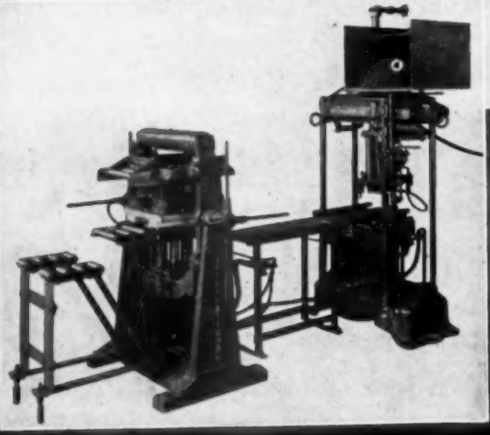

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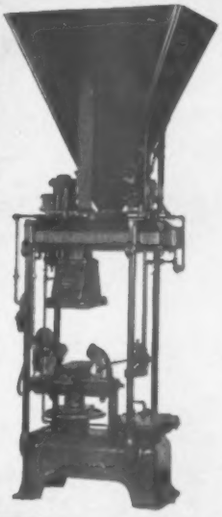

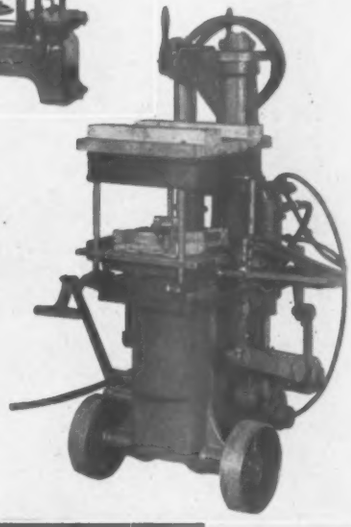

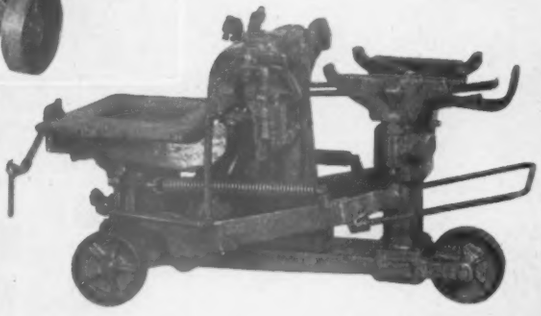

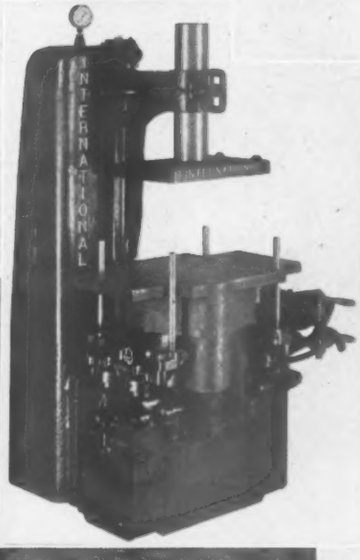

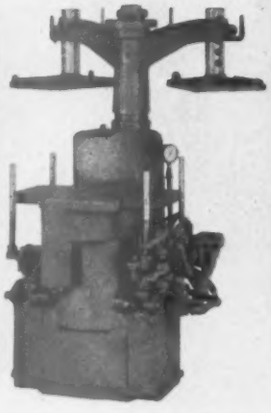

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GRAY IRON SESSIONS

Have Diversified Subjects

CONSIDERED from the standpoint of casting design, a cast iron for a given application should be selected with consideration of the microconstituents which make up the iron. Section thicknesses should be uniform, or a variation in properties in the different parts of a casting will be obtained. These were recommendations made by W. E. Mahin and H. W. Lownie Jr., formerly materials engineering department, Westinghouse Electric Co., East Pittsburgh, Pa., in a paper "Microstructure Related to Properties of Cast Iron," presented at the first of three sessions sponsored by the Gray Iron Division.

Alloying elements may be used to develop microstructures of increased strength and hardness and improved wear resistance, the author continued. Some others may be caused by effects of the alloying effects may be attributed to the control of graphitization; others may be caused by effects on the matrix.

If machinability and strength are desired in light sections, the type of iron used is especially important, it was pointed out. Very light sections must be carefully considered in the metallurgy of the iron to prevent occurrence of massive cementite and resultant difficulties with machining. Annealing will help, but it leads to low strength. If strength is desired in heavy sections, analysis of the iron must be selected to give the desired properties.

An excellent paper on "Cupola Operation and Control" was presented by W. W. Levi, metallurgist, Lynchburg Foundry Co., Lynchburg, Va. This subject, the speaker said, is a most controversial one and, in spite of the fact that there are almost as many cupola procedures as there are operators, results are for the most part quite satisfactory. His discussion was a description of practices followed in the foundries with which he is connected.

The cupola, Mr. Levi declared, has proved itself a most versatile melting unit, capable of producing a wide variety of irons satisfactory for innumerable engineering applications. Successful cupola operation requires an exact knowledge of the composition and behavior of the raw materials used — metallic components of the cupola charge, metallurgical coke and fluxing materials.

Session was concluded by reading of the abstract of the official exchange paper presented on behalf of the Association Technique de Fonderie de France. This paper, titled "The Technical Standpoint of the French Foundry Organization Plan," was prepared by M. A. Le Thomas, director of the Centre Technique des Industries de la Fonderie, Paris, who was not present.

The speaker pointed out that for the second time in a quarter of a century, French foundries are faced with the problem of rebuilding their plants, modernizing machinery and revising working methods. The problem of professional reconstruction has taken such a hold that it has gone beyond individual initiative. Only the government can provide the indispensible material means necessary for the rebuilding sought by French foundrymen. It has done so in a legislative measure providing means for financing technical research. A tax established a year ago on foundry products provides expenses of studies and research.

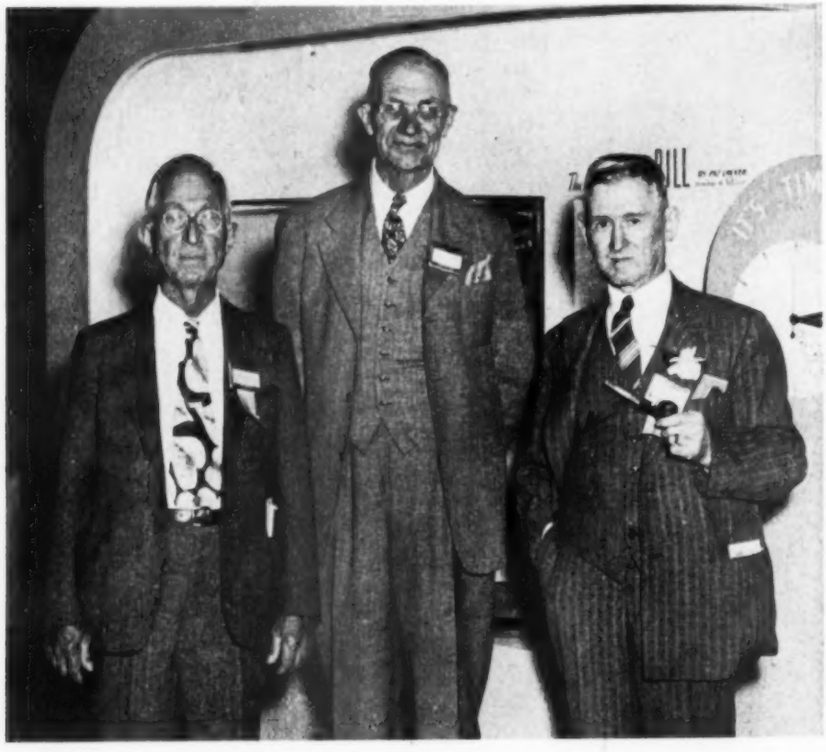
Provides for Technical Study

One half of this revenue supports the Centre Technique des Industries de la Fonderie an autonomous establishment which is devoted entirely to study of trade technical problems. The other half is given to firms, provided the money is used for their own technical studies. The balance of Mr. Le Thomas' paper described how this double operation works in practice.

Theories and the results of extended experimental work in the field of alloyed and heat treated gray iron were presented by three authors at the second gray iron session under the joint chairmanship of H. Bornstein, Deere & Co., Moline, Ill., and V. A. Crosby, Climax Molybdenum Co., Detroit.

In the first paper, by T. E. Eagan, Cooper-Bessemer Corp., Grove City, Pa., the author pointed out that considerable information is available on the heat treating of gray cast iron to increase the tensile strength; however, the effect of this heat treatment on the endurance limit has been more or less a neglected

(*Continued on page* 150)



167 YEARS: Combined period of service in the foundry industry of these three men, photographed during the AFA Foundry Show, is 167 years. Left to right, they are: Henry M. Oehling, coreroom superintendent, National Malleable & Steel Castings Co., Cleveland, who started his apprenticeship there at 14 and has been with the company 60 years; Al V. Magnuson, vice president, Champion Foundry & Machine Co., Chicago, who began his foundry career 52 years ago with National Malleable & Steel Castings Co. in Chicago, and since 1895 has been actively engaged in making and selling molding machines and coreblowers; and Pat Dwyer, engineering editor, THE FOUNDRY, whose first connection with the foundry industry dates back to 1891

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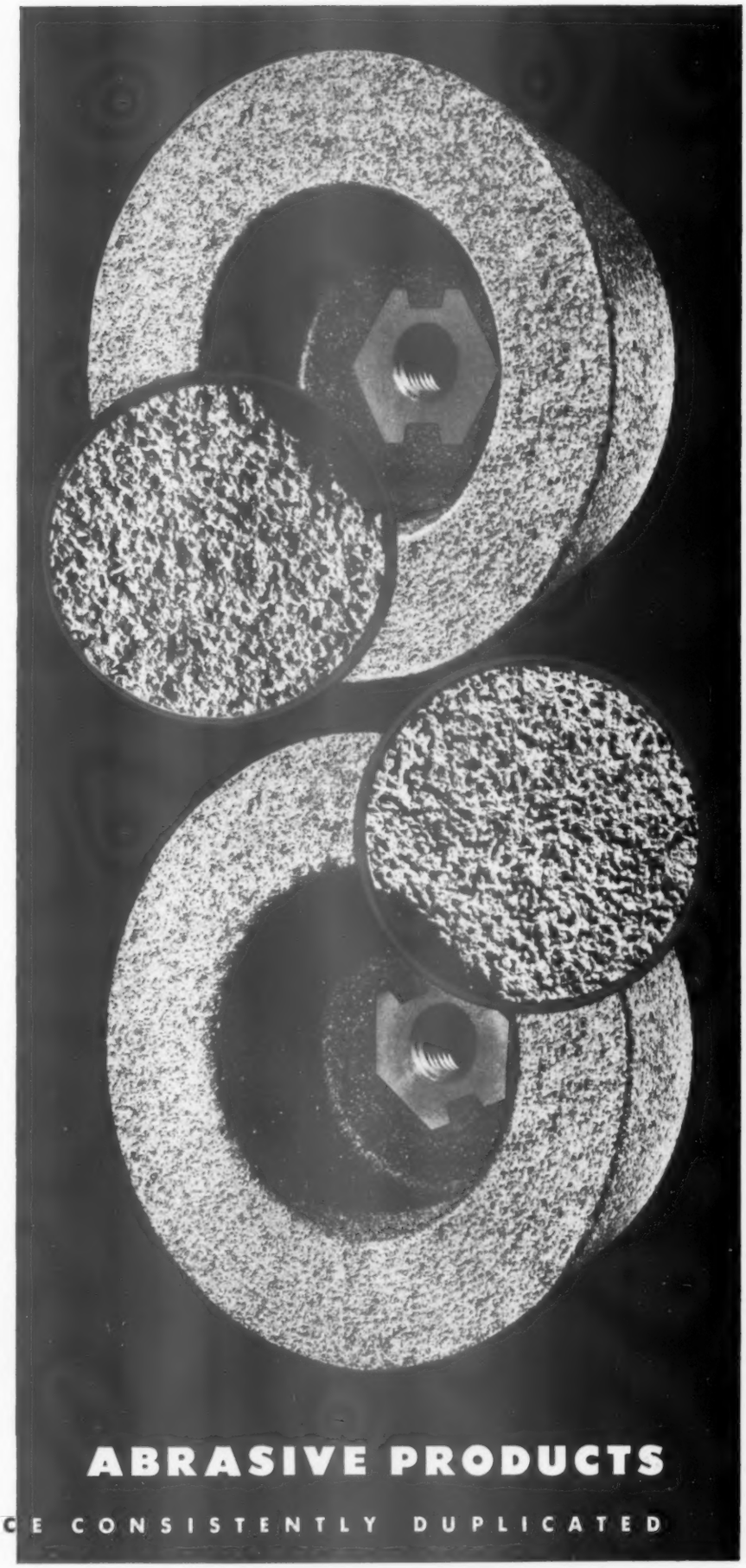


ABRASIVE PRODUCTS

TOP PERFORMANCE CONSISTENTLY DUPLICATED

(*Continued from page* 148)

subject. The effect of size of section and original microstructure on the final heat treated tensile strength and endurance limit apparently is an open field for investigation. Any conclusions that may be drawn from the data offered in the paper must be confined to the nickel-molybdenum and nickel-chrome-molybdenum alloyed gray cast irons. Also they must be confined to section sizes which have cooling rates analogous to those used for the test. A written comment by R. A. Flinn, American Brake Shoe Co., indicated that, in securing certain results, the author preferred manipulation of alloys rather than heat treatment.

In a discussion of engineering properties of heat treated cast iron, J. S. Vanick, International Nickel Co., Inc., New York, stated that the paper originally was presented in the Metropolitan Chapter's 1944-45 lecture course. Object of the paper is to simplify the description of heat treating processes and contrast *as cast* with *heat treated* in as simple a comparison as possible. Heat treatment of cast iron is dealt with comprehensively in the *Cast Metals Handbook*, and *Alloy Cast Irons*, published by the AFA.

In an interesting discussion on theories of gray cast iron inoculation H. W. Lownie Jr., formerly of Westinghouse Electric Corp., East Pittsburgh, Pa., stated that inoculation may be defined as that process in which an addition is made to molten cast iron for the purpose of altering or modifying the microstructure of the iron and thereby improving the mechanical and physical properties to a degree not explainable on the basis of the change in composition. The paper covered the mechanics and theories of the gray iron inoculation process.

R. G. McElwee, Vanadium Corp. of America, Detroit, announced that the *Cupola Operations Handbook* is completed and soon will be available for distribution. As chairman of the committee which prepared the book, he referred to the immense field covered and paid tribute to all connected with the work. He presented a review and commented on the various items in the table of contents.

A concluding session of the convention, but far from the least interesting, was that held Friday afternoon on the general subject of gray iron welding. Two papers were automotive in character, a third relating to repair welding of heavier gray iron sections. Chairman was E. C. Jeter, foundry engineer, Ford Motor Co., and co-chairman, J. J. Crowe, Air Reduction Sales Co., New York.

Report of an extensive investigation of the welding of gray cast iron sample plates, ⅜ x 3 x 8 in. in size, was presented by J. M. Diebold, welding engineer, General Motors Truck & Coach Division, Pontiac, Mich., who was assisted in the research by J. A. Blastic, Detroit Diesel Division of GM and J. A. Griffin, Pontiac Motor Division. The sample plates were of so-called General Motors 13M iron, with average tensile of around 38,000 psi. Holes of ⅜-in. diameter were drilled in the plates and various types of welds, ferrous and nonferrous, made over them, at room temperature and with 500, 1000 and 1400 F preheat and postheat. Following the welding and heating, hardness traverses were run and the changes in the heat-affected zones noted.

Both arc and gas welding methods were used, and electrodes, bare and coated, of gray iron, nickel and Monel metal were included in the study. In general it was found that a strength factor of about 70 per cent could be realized consistently in the welding; principal effect of preheating was to minimize thermal stresses; greatest production speed was possible with arc welding; sulphur content up to 0.27 per cent appeared to exert no deleterious effect on the weld or heat-affected zone.

Research work in the investigation was carried out during the General Motors strike, and occasionally under difficulty, but the presentation was well organized, clearly presented and makes a valuable contribution to the literature.

Wild Castings at Ford Plant

A glimpse into the production of welding repair department adjoining the Ford gray iron foundry was provided by W. Pfander, welding engineer, Ford Motor Co., Dearborn, Mich., who by means of exceptionally clear slides and text described how various types of defects in engine blocks, heads and other gray iron components are handled on the basis of an expected overall foundry production of 6000 engine blocks daily. About 85 per cent of all welding repair is by the oxyacetylene process. Larger castings with major defects are given preheat and postheat treatments in 40-ft continuous gas-fired furnaces. Other repairs are made in certain instances by use of the metallic arc welding process, with a rod analyzing 50-30-20 nickel-copper-steel. The entire Ford setup is a model of convenience and efficiency, typical of so many of the manufacturing operations in the Rouge plant.

Some differences in procedure are noted in the repair welding of heavy gray iron sections, because of their pronounced heat absorbing ability. These were explained by L. J. Larsen, Allis-Chalmers Mfg. Co., Milwaukee, who pointed out that because of the variety of the work it is not usually possible to develop standardized procedures or to set up ideal conditions. On heavy gray iron work, most of the generally accepted types of welding are possible, including metallic arc, carbon arc, gas weld-

(*Continued on page* 152)

(Photo by R. H. Jacoby, Key Co., East St. Louis, Ill.)

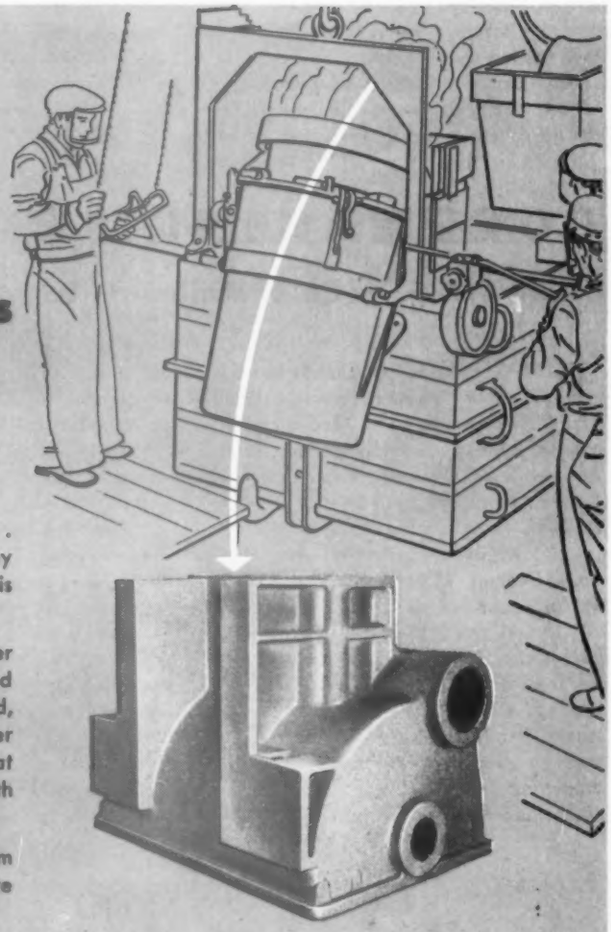
25-YEAR VETERANS: Special buttons being distributed at the AFA Foundry Show to visitors associated with the foundry industry 25 or more years

whenever they're casting

magnesium alloys . . .

you'll find these savings

—in handling—in machining



Two of magnesium's biggest advantages . . . lightness . . . machinability . . . are doing a daily economy job in many a modern foundry. The metal that makes products light is lightening production costs, too.

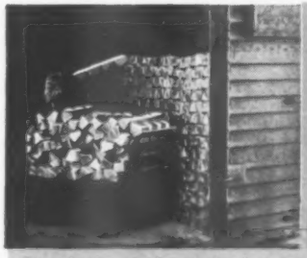
First, in handling, you'll find important savings in manpower and time—savings you get only from magnesium, one-third lighter than aluminum, one-fourth the weight of iron. Second, in machining, you'll see economy that's unmatched by other structural metals. With magnesium you can machine at highest speeds, remove maximum quantities of metal with minimum wear and tear on cutting tools.

Make these economies in your own plant! Turn to magnesium —get in touch with the nearest Dow office for complete engineering service.

Ready . . . to make products move!

MAGNESIUM

LIGHTEST OF ALL STRUCTURAL METALS



Dow is America's principal producer of magnesium, with a full line of casting alloys, fluxes, and also various accessory materials.

Facilities for working magnesium by all common methods are available in Dow's own complete shops and in many independent ones.

Standard procedures have been mapped out for all magnesium work, such as the heat-treating operation shown in this picture.

MAGNESIUM DIVISION • THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit • Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle

(*Continued from page* 150)
ing, bronze welding, etc.

Mr. Larsen described a special type of cast test plate, or coupon, which he designed and which is recessed to receive a weld deposit and so shaped that test bars can be cut from it to show the comparative strengths of the weld metal, the parent metal and combinations of the two.

COREMAKING PRACTICE

Is Chief Malleable Topic

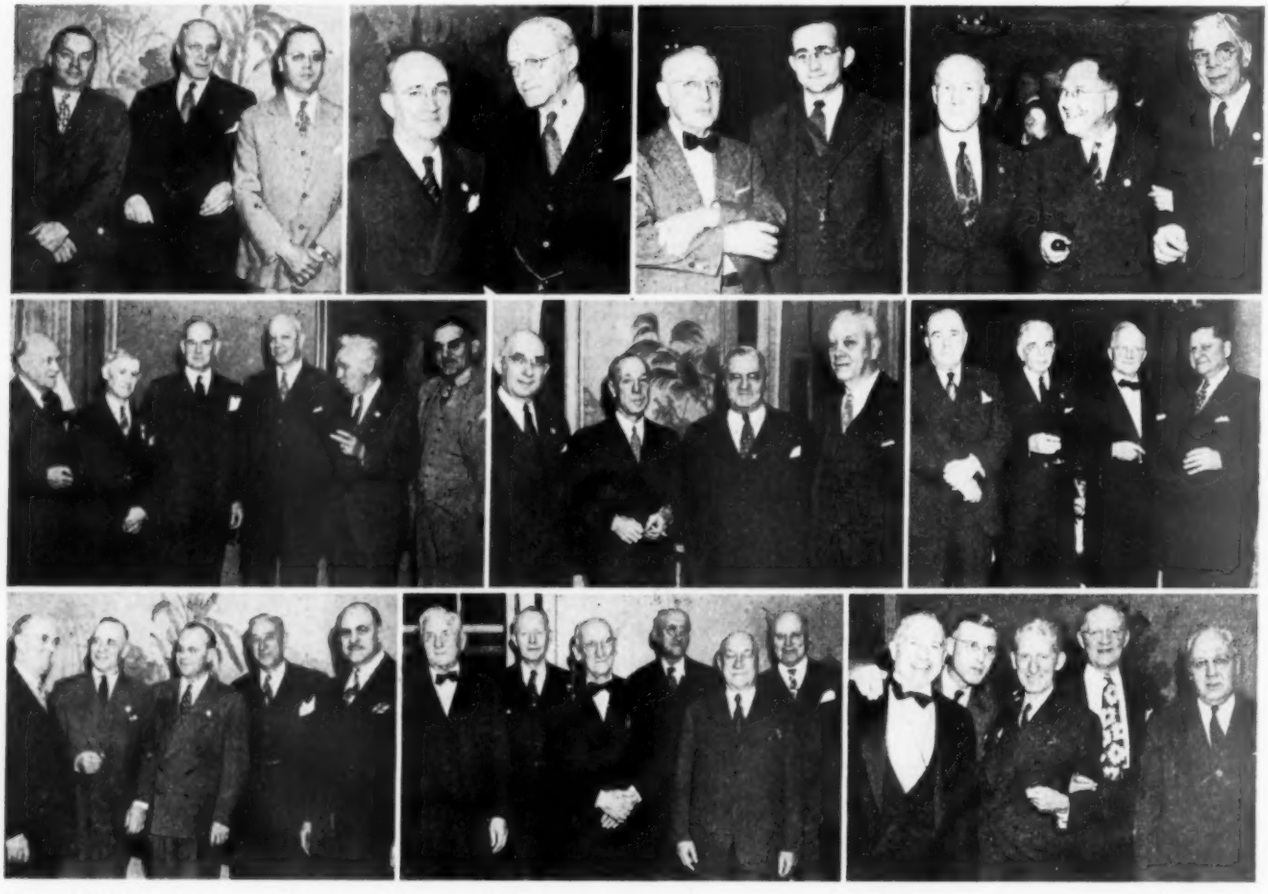
THREE sessions sponsored by the Malleable Division were devoted principally to discussion of coremaking practice at various malleable foundries. At the first of these sessions A. M. Fulton, Northern Malleable Iron Co., St. Paul, served as chairman, with C. F. Joseph, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich., as co-chairman.

The first paper prepared and presented by Dr. H. A. Schwartz, manager of research, National Malleable and Steel Castings Co., Cleveland, discussed the effects of various elements in malleable iron on graphitization and mechanical properties, based on a thorough survey of the technical literature and on the author's own researches. Elements affect the properties of malleable iron in one or more of the following ways: 1. By dissolving in ferrite and hardening or strengthening it. 2. By combining with carbon to form stable compounds. 3. By dissolving in austenite and altering the response to heat treatment either with regard to graphite formation or the separation of cementite. 4. By forming compounds which, though inert in themselves when present as sonims, alter the response to graphitization or the engineering properties by interrupting the continuity of the metal. An extensive bibliography at the end of the paper indicates the wide field covered and should serve as a useful guide to any person seeking an account of the work done by domestic and foreign metallurgical investigators.

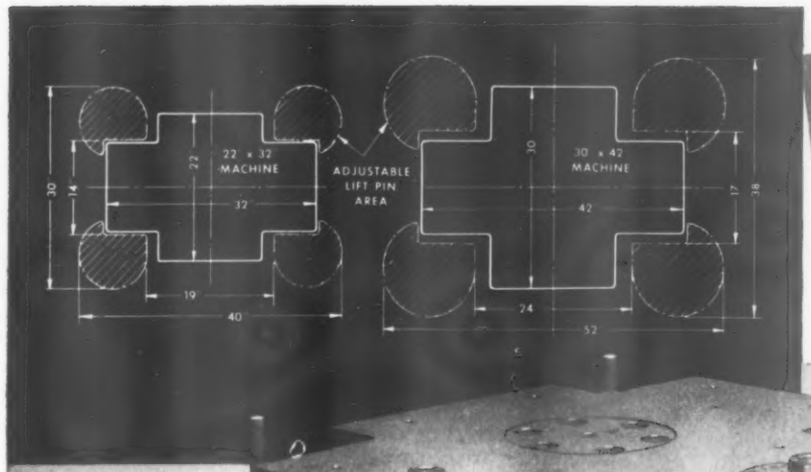
W. G. Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich., discussed cores for automotive malleable iron castings and, among other things, pointed out that up to the present no system of practical shop tests had been developed to check on the qualities of oil binders. He advocated a thorough study to determine what sand-oil combination gives the most satisfactory results, and dealing with a reputable source of supply which can be depended upon to furnish the required material. Keeping the oil content to a minimum is not only economic procedure but an important feature in the production of good castings. Instead of increasing the amount of oil in a core sand mixture to impart added strength to the cores, the employees should be trained to handle the cores with greater care.

In the speaker's foundry a not uncommon ratio of oil to sand is 1 to 200. Cores that show a tendency toward erosion or disintegration in the vicinity of the gates, are given a light coating of silica wash. On the subject of mixers

(*Continued on page* 155)



AFA ALUMNI: Scenes at the annual dinner of the AFA Alumni group at the Cleveland convention. The group consists of past presidents, members of the board of directors and recipients of AFA medals or honorary life memberships



Tabor

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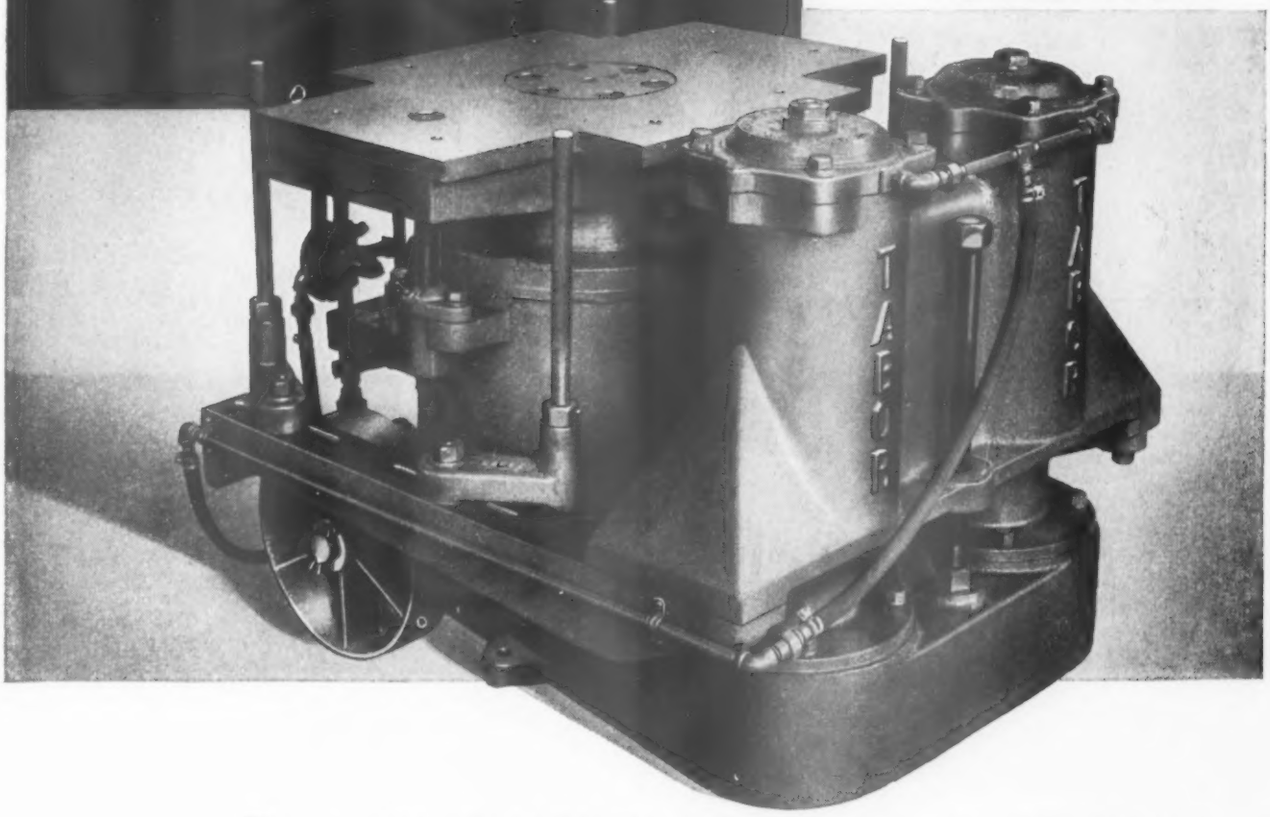

These new Tabor Flask Lift Machines allow working access from three sides. They are furnished either plain or shockless jar, in two table sizes—either stationary or portable.

SPECIFICATIONS

Size of Machine	22" x 32"	30" x 42"
Table Size	22" x 32"	30" x 42"
Capacity—80# Air	600#	1000#
Patt. Draw—Plain Jar	10"	12"
Patt. Draw—Shockless	9"	12"
Lift Pin Adjustment	See cut	See cut
Max. Width Flask with Center of Flask on Center of Jar Mach.	30"	38"
Min. Width Flask	14"	17"
Max. Length Flask	Unlimited within capacity of machine	
Patt. Draw.	Oil Controlled—Slow & Fast	
Height Table from Floor—Portable	28"	32"
" " " " Stationary	26"	30½"
Portable Mach. 3 Wheels	12" Dia. 3" Face	14" Dia. 4" Face
Stationary Mach.	3 Foundation Bolts	
Weight Shockless Jar	2600#	4000#
Weight Plain Jar	1900#	2700#

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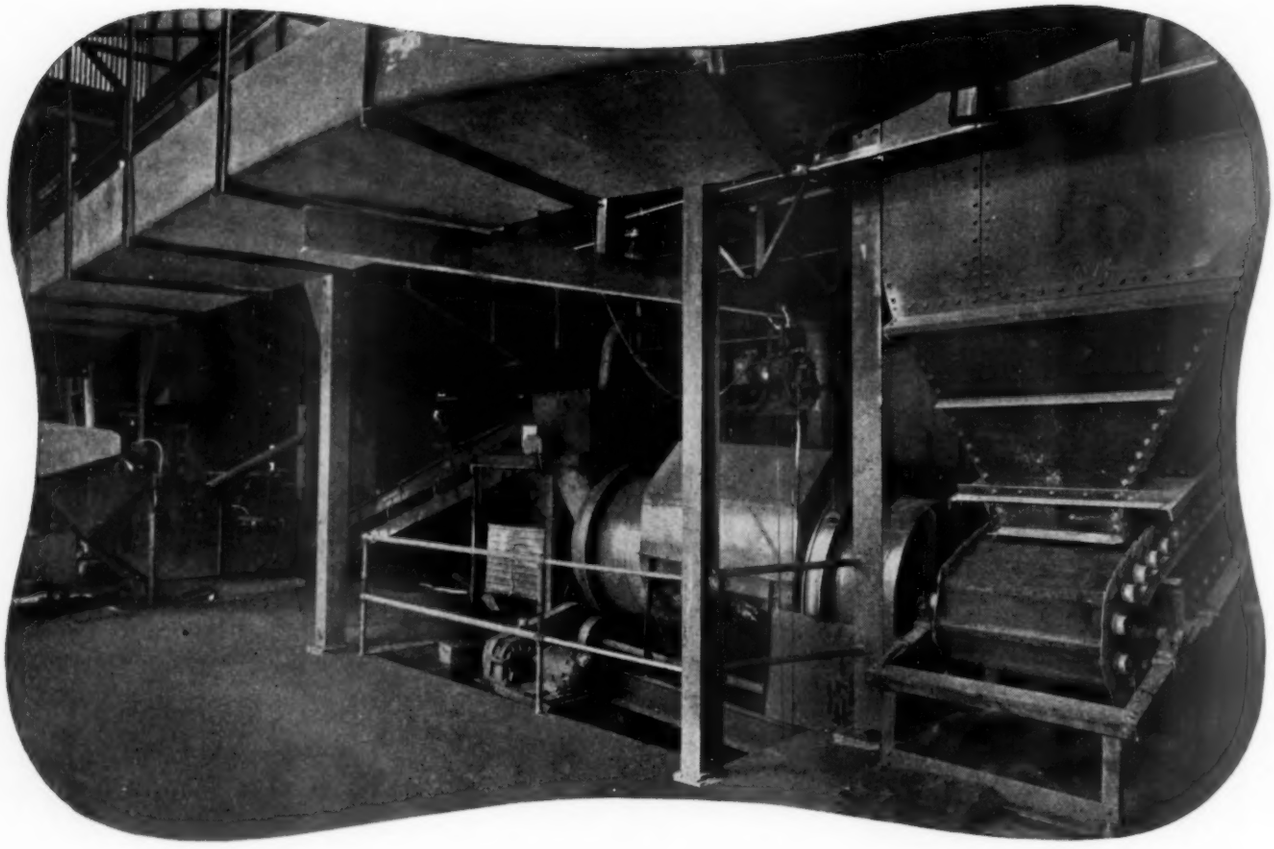

One Score and Twelve . . .

For more than 30 years, the new—now fully accepted—mechanized foundry technique, conceived and perfected by Bartlett-Snow foundry engineers has demonstrated its reliability and efficiency. Equally well suited to gray iron, malleable, steel and non-ferrous operations, whether large or small, Bartlett-Snow sand, mold and castings handling equipment enables owners to get a maximum of both quality and quantity from their plants. Costs go down when Bartlett-Snow equipment is used. The product finds readier sale. The workmen get larger take home pay—easier—like their jobs better. And the smoother, more even production means bigger profits, larger dividends for you. Can we send you more details?

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ENGINEERING REPRESENTATIVES IN THE PRINCIPAL CITIES

FOUNDRY SAND, MOLD AND CASTINGS HANDLING

(*Continued from page* 152)

and mixtures the speaker claimed that all mechanical mixers perform satisfactorily. The most important feature is to operate them intelligently. Measure all material and establish definite time cycles.

A comprehensive description of the functions, construction and operation of heat treating furnaces in foundry work, was presented by Victor Paschkis, research associate, Columbia University, New York. In a general summary he pointed out that heating of castings in piles is undesirable from the standpoint of uniform production. The disadvantages usually inherent in this method can be partly overcome by using salt bath furnaces, if permissible, or furnaces with forced convection and program control. If these methods are not possible, continuous furnaces should be applied. If they cannot be used, special attention should be given to distribution of heating means and to the thickness of the heated pile in radiation and combined radiation and convection furnaces.

Core Sand Enters System

Cores and core sand were discussed at the second malleable foundry practice session, at which R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis., presided and D. I. Dobson, General Malleable Corp., Waukesha, Wis., was co-chairman. Describing malleable foundry coremaking practice for pipe fittings and small castings, D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn., pointed out that core sand selection should depend partly on the type of shop, since in the mechanized foundry with central molding sand system, the core sand eventually goes from the shakeout into this system.

For small cores at the speaker's foundry the following mixture is used for hand-made cores: 6 bu Marion sand, 2½ qt linseed oil, 2 qt dextrine, 4 to 5 per cent water by weight. Similar size cores blown by machine use 5 bu Marion sand, 1 bu Jersey sand, 4 qt linseed oil, 7 qt dextrine, 2 per cent water by weight. For medium size cores made by hand the oil is reduced to 1¼ qt and water is increased to 5 to 6 per cent, while in the machine-blown core mixture the oil is cut to 3 qt and the water is raised to 3 per cent. Large cores, when made by hand, use a combination of 3½ bu Marion sand, 1½ bu Jersey sand, 1 bu sawdust, 1 qt linseed oil, 1 qt dextrine and 6 to 8 per cent water. When these cores are blown the mixture consists of 4 bu Marion sand, 1½ bu Jersey sand, ½-bu sawdust, 1½ qt linseed oil, 3 qt dextrine and 4 per cent water.

Cores are blown at 125 lb pressure, and it has been found that addition of 0.1 per cent kerosene to the sand helps to prevent sticking in the coreboxes and also slows air drying of the cores.

In a second paper on core sand practice, Joseph J. Clark, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich., described the operations and controls adopted by that company for the mechanized production of a large volume of cores. Controls are exercised from the inspection and testing of incoming sand, through mixing, coremaking and baking. Mr. Clark expressed the belief that in many cases too little consideration is given to the design and control features of coreroom installations. In such instances, it is next to impossible to exercise the basic controls essential to the process, despite use of the most elaborate testing equipment. On the other hand, when the installation is good and it is well operated, a comparatively few well chosen control procedures are sufficient to maintain a high standard of control.

Coremaking practice received further consideration at the concluding malleable session, which had W. D. McMillan, International Harvester Co., Chicago, as chairman and D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn., as co-chairman. Eric Welander, Union Malleable Iron Works, East Moline, Ill., described that company's practice in making cores for malleable castings used principally for agricultural purposes and ranging in weight from 1 oz to 25 lb. Sand most commonly used is a local bank sand containing a small amount of clay. Three other sands employed are washed and dried Ottawa silica sands.

Mixtures include a combination of varying quantities of sand, cereal binder, oil, kerosene and water. Dry ingredients first are mixed together for 1 minute before liquids are added, total mixing time ranging from 4 to 6 minutes. Kerosene is added in almost all mixtures to prevent sticking in the coreboxes. Total baking cycle for the continuous horizontal gas-fired oven is about 3½ hours, with about 1½ hours spent in the baking zone at a temperature range of 410 to 420F. Close control is maintained over the quality of incoming sand core oil, moisture content of the mixture, as well as over mixing time, baking temperature and inspection of finished cores.

In the final discussion on malleable

FOREIGN VISITORS: Some of the more than 50 visitors from foreign countries who attended the reception sponsored by the Northeastern Ohio Chapter, AFA, at the recent Cleveland convention

coremaking practice, E. C. Zirzow, National Malleable & Steel Castings Co., Cleveland, stated that too many foundries have concentrated their attention on molding sand problems while neglecting core sand practice. Mr. Zirzow gave a general description of coremaking procedures at his plant where 50 to 60 tons of core sand are used a day. Usual procedure is to mix dry ingredients 1 minute and mix another 4 minutes after adding oil and water. About 90 per cent of the cores are blown. Core oil used is blended by the foundry and consists of a 50-30-20 ratio of linseed oil, resin and kerosene.

Moisture ranges as high as 5 to 6 per cent in some cases, but moisture is not a limiting factor in blowing cores if the boxes are properly vented, according to the speaker. Various tests are conducted regularly during the different operations, one that is considered among the most important being to check gas content. Determination of adequate baking is ascertained by the use of a "step" core which is granduated in section thickness up to 5 in. and made from a sand mixture to which a dye is added. This dye volatalizes when temperature reaches 400 F, and by breaking open the test core after baking, the absence or presence of the dye indicates to what thickness the 400° temperature has penetrated. This is regarded as a handy and satisfactory shop test.

SAND CONTROL METHODS

Discussed at Shop Course

SAND control in different types of foundries was discussed at the five sessions sponsored by the Sand Shop Operation Course Committe. The opening meeting, which had "Magnesium Molding Sands" for its subject, was presided over by F. S. Brewster, Dow Chemical Co., Bay City, Mich. Serving as discussion leader, Oscar Blohm, Hills-McCanna Co., Chicago, stated that it is well worth while to use the best possible sand since it makes control easy and provides good castings. His choice of sand is the synthetic type, as it can be tailored for any specific type of work and changed comparatively easily.

Mr. Blohm advocated close sand control and stated that while the metallurgical department should be responsible for recommendations, the actual carrying out of them should be the responsibility of foundry personnel. He suggested as a suitable sand mix for magnesium casting a mixture of two silica, clay-free sands of 68 to 73 grain size and around 140 grain size, combined in the ratio of 40 down to 10 per cent of the latter and the remainder the coarse sand. This provides the permeability of the coarse with the smooth surface of the fine sand. Particular combination for each shop would have to be developed to meet desired conditions. To this is added 1.5 per cent ammonium silicofluoride, 0.8 per cent boric acid, 0.6 per cent sulphur, 3 per cent western bentonite, and 1 per cent ethylene glycol. Moisture should be around 2 per cent with a maximum of 2.5 per cent.

Second session of the Sand Shop Course, with D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn., as chairman, had E. C. Zirzow, National Malleable & Steel Costings Co., Cleveland, and L. R. Spann, Eastern Malleable Iron Co., Naugatuck, Conn., as discussion leaders.

Discussing malleable molding sand control, Mr. Zirzow described briefly the procedure in his foundry, which is mechanized and produces castings weighing from 2 oz to 300 lb. While the sands vary in different systems producing the different sizes of castings, they all are made up from a 50-grain medium sand, a 30-grain coarse sand and a 90-grain fine sand. These are mixed with combinations of fireclay and bentonite as well as seacoal, fuel oil and gilsonite to meet certain requirements. Control is maintained by running tests every half hour on moisture, green compressive strength and permeability. Average moisture is from 4 to 4.5 per cent; green compression 7 to 7.5 psi and 80 to 90 permeability.

Mr. Spann stated that his shop is not mechanized and control is not nearly as elaborate as the one previously described. Sand used is prepared from a mixture of Albany with a permeability of 18 and a Jersey sand with a permeability of 80 to 100. Sand control includes testing for strength and permeability. On one foundry the tests cover one fourth of the floors each day, while in the other the tests cover one-half the floors. Mr. Spann also mentioned that where some difficulty had been encountered with pinholing in pearlitic malleable, it had been overcome by addition of 3 per cent boric acid and 1 per cent fuel oil to the sand, and that the procedure is a proprietary process.

Sand Handling Is Important

Third session of the Sand Shop Course was devoted to brass and bronze foundry sand control and had for its object the determining of better methods for sand handling. The subject was introduced by William M. Ball, Magnus Metal Division, National Lead Co., Cincinnati, after which discussion was of a conference nature.

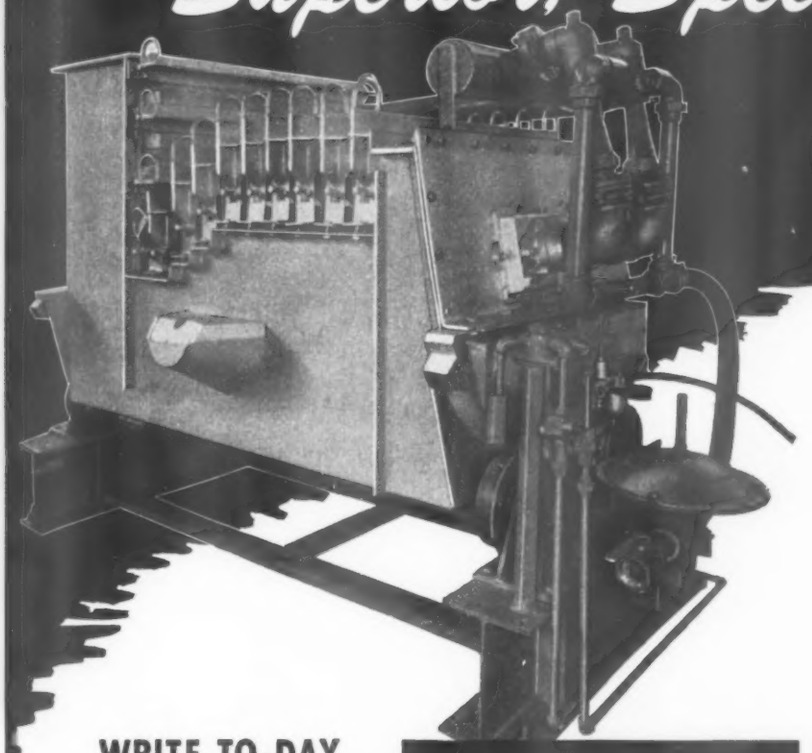
Among principal considerations in brass and bronze casting work, Mr. Ball listed composition of metal, pouring temperature, physical characteristics of the metal during pouring, specifications for the castings, design of castings and change in condition of the sand. The three important items in making castings, he continued, are the metal itself, the equipment and the sand. In his opinion, the sand accounts for production of as much scrap as the metal and equipment combined.

Desirable characteristics of sand Mr. Ball enumerated as availability, durability, sintering point, flowability, strength and fineness. A considerable portion of the general discussion centered on vein-

(*Continued on page* 158)

AT THE SHOW: Brig. Gen. Donald Armstrong, commandant, Industrial College of the Armed Forces, and principal speaker at the annual AFA dinner, shown inspecting a booth at the Foundry Show with, left to right, Fred J. Walls, national AFA president, and S. C. Massari, of the national AFA headquarters staff

Use STROMAN FURNACES for *Superior, Speedy Melting*



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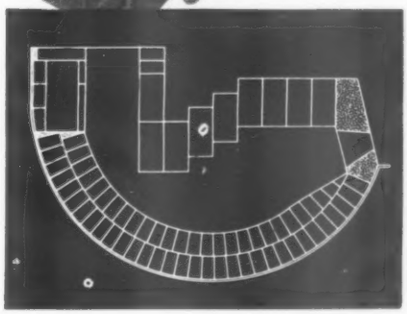
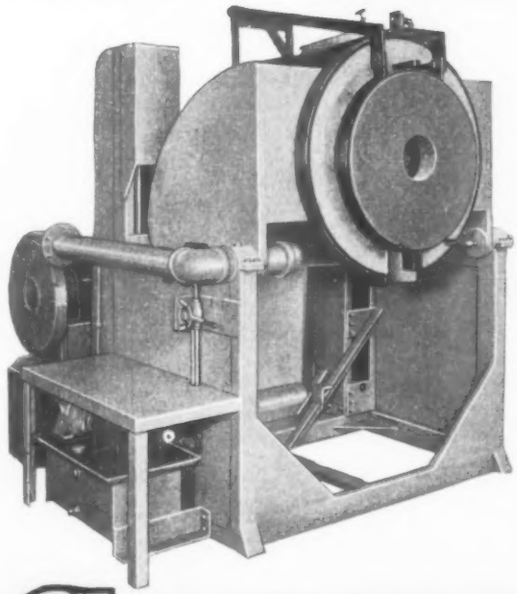
Sklenar Non-Crucible, Direct Fired, Improved Reverberatory Melting Furnaces are the fastest melting furnaces built . . . Quality is unexcelled, both physicals and chemicals. Made in sizes to handle 300, 500, 750, 1000, and 2000 pounds brass capacity they are without a doubt the most advanced, efficient, and economical non-ferrous melting furnaces on the American market . . . however hundreds are in use in England where they were originated. BRASS is being melted in the astounding time of 15 to 40 minutes, depending on the size of furnace.

The furnace illustrated is also highly successful in the making of GREY IRON CASTINGS . . . and melting time for this metal has been clocked between 30 and 60 minutes a heat . . . producing only the best quality grey iron. With a Sklenar Furnace you can operate your grey iron foundry like a brass foundry, by pouring successive heats throughout the day, using the same floor space. Sklenar Furnaces are also highly successful in the melting of ALUMINUM, doing their melting job in the fastest time ever known and giving excellent quality.

WRITE TO-DAY FOR COMPLETE LITERATURE ON ALL TYPES OF NON-FERROUS METAL MELTING FURNACES.





Sklenar design is unique. Metal is charged into a hopper which is also an exhaust from the combustion chamber. Here metal is preheated and melted at the throat of the hopper. Cold metal does not reach the molten bath. Charging is continuous. These furnaces will melt faster and show fuel savings from 30 to 40%; as the combustion chamber is heated by the same fuel used to melt the metal in the throat of the hopper.

Sklenar Furnaces may be fired by either Gas or Oil. Full information will be sent upon request.

STROMAN STATIONARY LIP POUR CRUCIBLE MELTING FURNACE

Stroman manufactures all types of crucible and iron pot melting furnaces for Brass or Aluminum. They are all the last word in modern design, quality construction, operating ease and economy.

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. 300 W. ADAMS ST. CHICAGO 6

(*Continued from page* 156)
ing of cores, a trouble encountered by all brass and bronze foundrymen.

Fourth session of the Sand Shop Course was devoted to gray iron sand control.

The subject was introduced by a paper "Some Factors To Consider When Purchasing Core Sand," contributed by H. Louette, factory superintendent, Warden King Ltd., Montreal, division of Crane Co., and A. E. Murton and H. H. Fairfield, metallurgical engineers, Bureau of Mines, Ottawa.

Specifying grain size only in purchasing core sand is not a sufficient precaution to insure that a suitable sand will be obtained, the authors stated. Effect of a grain shape upon many of the properties of core sand mixtures is pronounced. The rounded grain has many advantages over the angular shaped grain, these including lower core oil consumption, easier coremaking operations and less gas and smoke in the foundry.

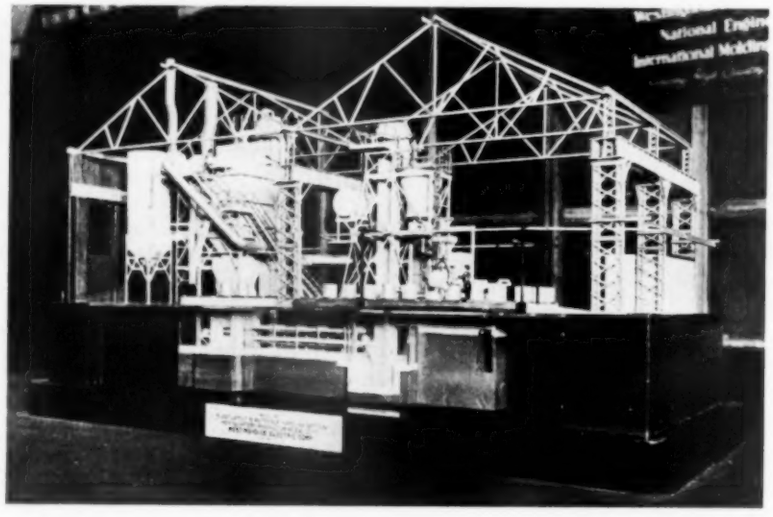
Previous to the investigation, properties considered by Warden King Ltd. when core sands were examined were: Refractoriness; AFA grain fineness; amount of clay, dirt and foreign mater; and grain size distribution. The investigators now feel that preference should be given to a sand with rounded smooth surfaced grains. They also advise that a low-power microscope is a very useful tool to use in estimating the suitability of core sands.

R. H. Jacoby, Key Co., East St. Louis, Ill., presided at the fifth session of the Sand Shop Course. E. E. Woodliff, Foundry Sand Servicing Engineering Co., Detroit, and chairman of the committee, gave what was voted the most enlightening information on steel foundry sand control that the many interested listeners had heard. Mr. Woodliff used two charts, one showing high temperature bonding range for some common foundry sand binders from room temperature to 2500 F, and the other showing how some foundry sand materials such as sand, water, cereals, dextrine, resin, bentonite, fireclay, core oil, silica flour, iron oxide and wood flour, affect spalling, smoothness, permeability, green stage, baked stage and collapsibility.

Mr. Woodliff stated that sand formulas require particular study and involve an understanding of sand binders, each one of which must be considered separately. He discussed organic or combustible, and inorganic or incombustible binders, stressing that binders must not be thought of at room temperature only, but in the higher temperatures. Core oils cannot be classified as room temperature binders, he said.

He gave suggestions for increasing bonding strength and said that because of the shortage of many core binding materials it may be necessary to work a weaker sand in the future.

New Molding Unit Is Largely Automatic



ATTRACTING considerable interest at the recent AFA Foundry Show in Cleveland was the automatic high-speed molding unit model shown here, displayed by the International Molding Machine Co., Chicago. This unique unit was designed for the Cleveland foundry of Westinghouse Electric Corp. by International and National Engineering Co., Chicago. Occupying 1500 sq ft of floor space, it will require about 45 tons of sand per hour in producing molds for 2½-lb end brackets used on small electric motors. Unusually high production is expected to be attained, but with the extensive use of electrical controls and mechanized equipment, only operators will be needed.

In addition to the molding facilities, the unit also will shake out the molds, recondition the sand for subsequent use, clean the castings and place them on conveyors for collection and shipment. Actual installation is expected to be completed by September. This model was built by the plant layout and materials handling section of Westinghouse's headquarters manufacturing engineering department.

Book Review

Handbook of Cupola Operation, published by the American Foundrymen's Association, 222 West Adams Street, Chicago 6, Illinois. Price $5.50.

Since its organization in 1939, the cupola research committee of the AFA has been engaged in the compilation of the material presented in this handbook. The text is the most complete ever assembled in one volume on the subject of cupola construction and operation, and represents the contributions of a large number of individuals and companies serving on committees and sub-committees of the cupola research project, a part of the technical development program of the AFA.

Following a brief discussion on the historical phases of the metallurgy of iron, the text considers in considerable length the various problems connected with the operation of the cupola. This is followed by information on construction details of the cupola itself, tuyeres, linings, charging equipment, blowing equipment, blast control equipment, forehearths and receiving ladles, methods of slag disposal, etc.

The various raw materials used in the cupola are considered and classified, including pig iron, scrap, alloying elements, coke, fluxes, desulphurizers, etc. Attention is given to the melting of nonferrous metals in the cupola. Information is included on the fundamental thermochemical principles applicable to cupola operation and to combustion control in the cupola by analysis of effluent gases. The last chapter in the book considers the constitution of cast iron.

Appendix I deals with the applications of cast iron, appendix II with classified list of references on cupola practice, and appendix III with a bibliography on cupola practice.

The various committee members and the national office staff, who edited the book, are to be congratulated upon the completion of this volume. Every foundry operating a cupola will find this volume highly valuable.

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Use Alcoa Pig and Ingot and be assured, when making mixes, that the next batch will behave just like the previous one . . . right to given specifications.

Assured, because into their production go more years of experience than can be found anywhere else . . . 58 years of knowing how to make them consistently sound, uniform, and free from inclusions.

A better aluminum to start with . . . your castings will be better at final inspection. Where to place your order? Call your nearby Alcoa Sales Office. Or write ALUMINUM COMPANY OF AMERICA, 1823 Gulf Bldg., Pittsburgh 19, Pa.

ALCOA FIRST IN ALUMINUM

ALCOA ALUMINUM

ANNUAL LECTURE COURSE

Considers Foundry Control

FOUNDRY control was the subject of the 1946 series of five lectures arranged by the Annual Lecture Committee. These sessions, covering controls as applied to aluminum and magnesium, malleable iron, brass and bronze, steel and gray iron foundries, were well attended.

The first session, dealing with aluminum and magnesium controls, was under the direction of David Basch, Almin Co., Schenectady, N. Y., assisted by Hiram Brown, Solar Precision Castings, Des Moines, Iowa. Oscar Blohm, Hills-McCanna Co., Chicago, discussion leader, urged that particular attention be paid to cost, production and quality, without sacrificing one to the other. He named preventive control through analysis of patterns and drawings before starting a job, analysis of foundry scrap, venting of cores to avoid blows, regular inspection of equipment, and investment in x-ray equipment, sand control systems, a microscope, and small chemical laboratory as important factors in scientific control of foundry defects.

Mr. Basch added that the holding of castings to strict specifications should be carried over into peacetime production, to insure quality. Mr. Brown, in conclusion, stated that a good inspector, established in the foundry, will save more than his own salary in securing necessary controls.

Magnesium Is Not Dangerous

In the ensuing discussion period questions were answered covering individual foundry control problems. Edward S. Christiansen, president of the Magnesium Association, stressed that magnesium, contrary to opinion held by many founders, is not a dangerous metal to handle, but requires a knowledge of its physical properties for effective usage.

Carl F. Joseph, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich., presented the lecture at the second session, his subject being "Malleable Foundry Control." Combining suggestions for controlling quality of malleable iron castings and for producing them at the lowest price consistent with goood quality, Mr. Joseph enumerated controls to be exercised from arrival of raw materials at the foundry to shipment of the finished product.

Analysis of pig iron, steel scrap, coke and limestone was stressed as important, as well as close control over incoming shipments of sand, core oil and binders in order to maintain uniformity. In operation control of processes, the speaker stated that melting and pouring conditions are of paramount importance in effecting product quality. He recommended employment of adequate personnel to carry out technical control in attaining production of uniform iron. Slag control methods, melting operations and individual problems were discussed in the question-and-answer period following the talk.

The third lecture course session, under the chairmanship of C. O. Thieme, H. Kramer & Co., Chicago, had D. Frank O'Connor, American Saw Mill Machinery Co., Hackettstown, N. J., as discussion leader. In his paper covering brass and bronze foundry control, Mr. O'Connor stressed the need of organizational control of variables affecting the foundry, to prevent excessive scrap and other losses. Emphasizing that melting, coremaking, molding, pouring, cleaning and inspection departments must have supervisors equipped with, or capable of absorbing technical information, Mr. O'Connor stated that it is only through the co-ordination of these key men and their departments that satisfactory and sound castings may be obtained.

Supervisors Supply Reports

Supervisors in charge of operations and equipment should record each operation for comparative use and discussion. Preheating of ladles and furnaces to determined temperatures of metals, establishment of pouring ranges to control the metal, thorough and capable mixing of sand, and use of pyrometers, gages and water meters to assure temperature and moisture control, were mentioned as necessary and practical. Inspectors should have responsibility for following up defects appearing in castings and should present these problems to responsible authorities for remedies and corrections, said the speaker. In conclusion he urged that records be analyzed to determine reasons for error, responsibility for mistakes and costs of materials.

C. E. Sims, Battelle Memorial Institute, Columbus, O., presided at the fourth lecture, which was devoted to steel foundry control. The chairman presented G. A. Lillieqvist, American Steel Foundries, East Chicago, Ind., who has spent much time in study of the subject both here and abroad. Mr. Lillieqvist discussed controls in the melting, sand, heat treating and inspection departments, beginning with analyses or tests of incoming raw materials through the departments mentioned.

He stated that close watch must be kept throughout the foundry to assure that proper weights, temperatures or properties prevail. Any relaxation of control may be conductive to increased scrap or higher production costs. Using slides to illustrate his points he showed charts used for recording determination of carbon content of steel, determination of fluidity before tapping, reports made on inspections throughout the plant so that necessary changes could be made.

X-ray testing for internal defects and brinell testing of quenched and tempered castings for uniformity were illustrated, as well as slides showing tests made on sand cores to determine content of silicon in the steel. Discussion after the talk took the form of a question-and-answer period.

A thorough discussion of gray iron foundry control was presented by W. A. Hambley, Allis-Chalmers Mfg. Co., Milwaukee, at the concluding lecture. J. S. Vanick, International Nickel Co., New York, presided.

Speaking with particular reference to foundries engaged in the production of engineering materials, Mr. Hambley emphasized the need for full control—not a half-hearted, hit-and-miss procedure with control rigidly applied at some stages and not at others. Even where the foundry is small and funds are not available for elaborate equipment and a large engineering staff, much can be accomplished through the use of outside engineering and laboratory services, he declared.

Efficient Operation Builds Reputation

He cited not only savings that might be made as a result of more efficient operations, but the importance of building up a reputation as a producer of sound castings, which means the ability to hold customers, add new ones and often to obtain premium prices.

Mr. Hambley said that control in the modern engineering foundry should start with the design of the casting, pointing out that design can cause or contribute to 19 of the known 30 defects that can develop in a gray iron casting. He discussed materials and types of equipment, placing emphasis upon standardization where possible, and took up various steps in coremaking, patternmaking and melting, showing what might be done to add more effective control.

Many foundries are so busy these days, he said, that they fail to see the need for any extensive control. But, he warned, the day is coming; it may be two years off, or it may be five years. Eventually competition is going to become severe; it is well now to start preparing for that day, he emphasized.

More New Fluorine Compounds by General Chemical

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BIFLUORIDE

POTASSIUM
KF • 3HF
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FLUORIDE

SOME POTENTIAL USES:

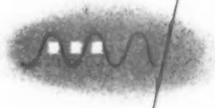
HEAT TREATING—Means of controlling the melting point of heat-treating salts.

GLASS—In etching glass or other silicon-bearing products. As "frosting" agents.

CERAMICS—As opacifiers. As materials to increase the fluidity and alter the melting point of the mix.

CHEMICAL PROCESSING Source of HF in dry form. For preparation of elemental fluorine by electrolysis.

ELECTRONICS—Special medium for etching quartz crystals.



MINING—Agents for digestion of insoluble ores.

METALLURGY—As ingredients in fluxes and pastes for welding, brazing or soldering. For surface preparation of aluminum and stainless steel before spot welding.

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¶ Logical, isn't it? Well, here is a bonding clay specially compounded to give you superior results on such work—from one ton to 150 tons. It gives you moderately high green strength, very high dry strength and extremely high hot strength. The name is—

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¶ Do you need thermoplastic properties? You'll get them in Balanced Revivo. It softens at high temperatures, forming an extremely tough, resilient sand which prevents buckling and cope pull-downs.

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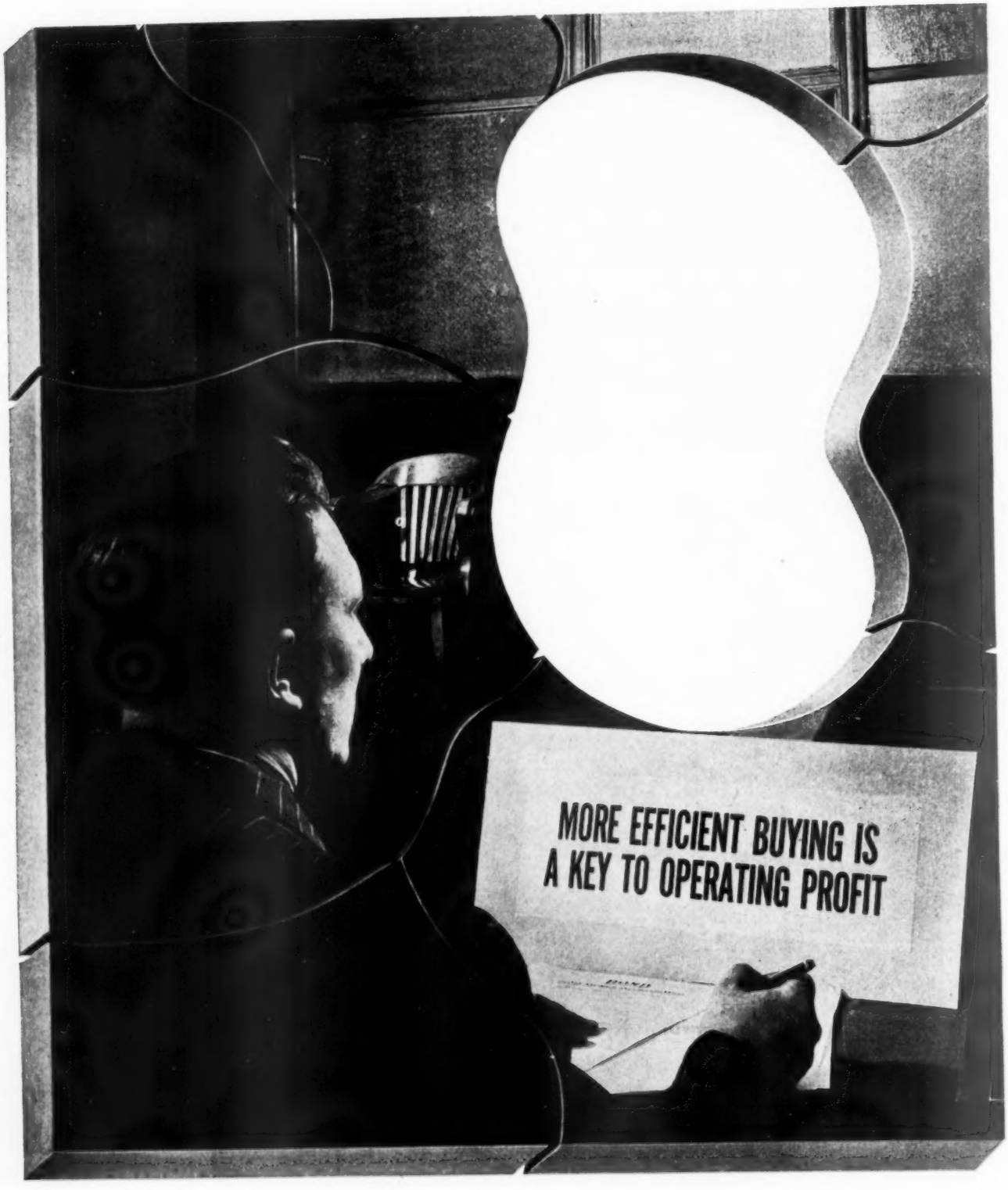
Scenes at the AFA Foundry Show

ALTHOUGH the recent Cleveland convention marked the 50th anniversary of the American Foundrymen's Association, the first full scale exhibit of foundry equipment and supplies to be held in conjunction with the annual AFA meetings was not held until 1906. This

(*Concluded on page* 166)

Use HIM...and the



picture is complete

Key figure in modern efficient buying, your local CARBORUNDUM distributor offers prompt intelligent service for your abrasive requirements. No one is in better position to give you what you want, how you want it, and when you want it. From large and varied assortments of standard types, sizes and shapes, your order for wheels, coated abrasives, and sticks by CARBORUNDUM receives immediate attention.

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TRADE MARK

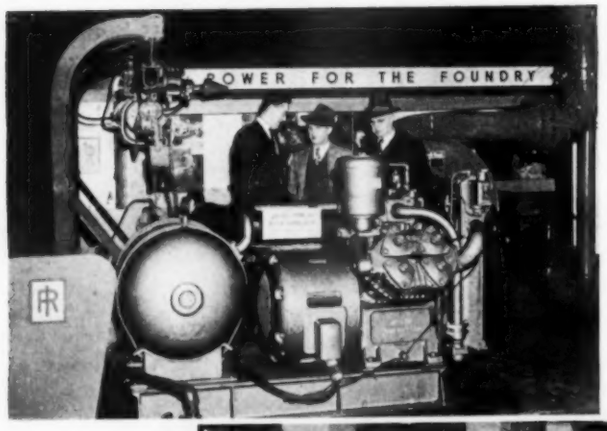
"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company

AFA Foundry Show

(*Concluded from page* 163)

initial Foundry Show, staged in Cleveland, had only 50 exhibitors. Among the approximately 290 exhibitors in the recent 1946 show were 14 companies who also were among the 50 participants in the exposition of 40 years ago. They include:

Arcade Mfg. Division of Rockwell Mfg. Co., Freeport, Ill.; Ayers Mineral Co., Zanesville, O.; Chicago Pneumatic Tool Co., New York; Chisholm-Moore Hoist Corp., Tonawanda, N. Y.; Cleveland Wire Spring Co., Cleveland; Herman Pneumatic Machine Co., Pittsburgh; Osborn Mfg. Co., Cleveland; Pangborn Corp., Hagerstown, Md.; W. W. Sly Mfg. Co., Cleveland; Smith Facing & Supply Co., Cleveland; Standard Sand & Machine Co's Blystone Division, Chicago; Tabor Mfg. Co., Philadelphia; THE FOUNDRY, Cleveland, and Whiting Corp., Harvey, Ill.



Molybdenum Improves Quality of CASTINGS

Molybdenum as an alloying agent in castings found greatly enlarged uses under war necessity and the resulting knowledge is now being translated in terms of peacetime production. High strength in heavy sections and uniform strength in both heavy and light sections are among the characteristic advantages of the molybdenum alloys. A wide range of physical properties, obtainable by heat treatment, opens new possibilities to the designer of castings, in economy of weight and durability under severe conditions of service.

The Molybdenum Corporation, as a supplier of Molybdenum, Tungsten, and other alloying materials, is glad to be consulted by any user of these products.

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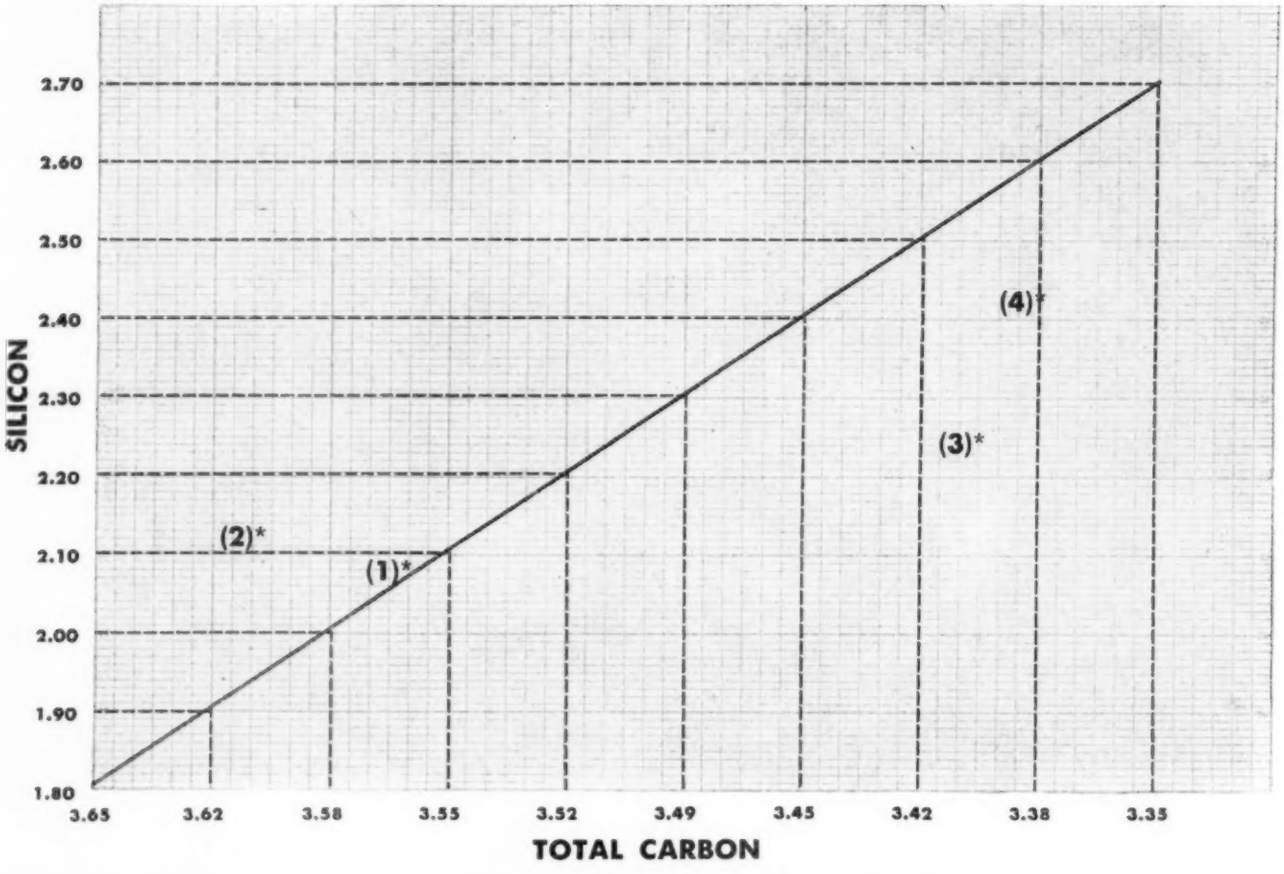
ISN'T THIS...
WHAT YOU'VE BEEN WAITING FOR?

SILICON-CARBON CHART FOR "G"-IRON



You will get sound, close-grained gray iron castings, with good machinability, of 30,000 to 33,000 tensile strength by using the above combinations of Silicon and Total Carbon—and not less than 35% G-Iron pig—in your cupola mixture. Write for your copy of this helpful chart. No obligation, of course.

TEST DATA ON SAMPLES FURNISHED BY FOUNDRIES USING G-IRON

Number	Percent Silicon	Percent Total Carbon	Percent Steel Scrap	Tensile Strength	Brinell Hardness
*1.	2.08	3.56	—	31,800	207
*2.	2.11	3.61	—	31,700	207
*3.	2.26	3.40	10	33,300	187
*4.	2.41	3.38	15	33,900	196

TONAWANDA
for sound castings

TONAWANDA IRON CORPORATION

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Division of American Radiator & Standard Sanitary corporation

A GLOSSARY OF TERMS EMPLOYED IN THE FOUNDRY

(Concluded from June issue)

TEST COUPON—A special, well-fed casting from which tensile or bend test specimens are cut and subsequently machined.

THERMOCOUPLE—A bi-metallic device capable of producing an electromotive force roughly proportional to temperature differences on its hot and cold junction ends and used in the measurement of elevated temperatures.

TIN—One of the elements whose chemical symbol is Sn. Its formula weight is 118.70; specific gravity 7.31; melting point 231.85 C.

TITANIUM—One of the elements whose chemical symbol is Ti. Its formula weight is 47.90; specific gravity 4.50; melting point 1800 C.

TONGS—Metal instrument with two legs joined by a hinge for grasping and holding things such as crucible tongs.

TOP BOARD—A wood board on the cope half of the mold to permit squeezing the mold.

TOTE BOX—Metal or wood box used for transporting materials.

TRAM RAIL—Single elevated or overhead rail carrying trolleys on which materials are transported.

TRANSFORMATION RANGE—The range of temperatures at which changes in phase of iron-carbon alloys occur.

TRIMMING—Removing fins, gates, etc. from castings.

TROLLEY—A wheeled carriage running on an overhead track (tram rail).

TUMBLING BARREL—A revolving metal or wood box or barrel in which castings are cleaned

TUMBLING MILL—See tumbling barrel.

TUMBLING STAR—See jack star.

TURNTABLE—Circular table mounted on rollers or wheels so that it may be rotated.

TUYERE—Opening through which the air blast enters the cupola.

UNDERCUT—Part of a mold requiring a drawback. See drawback.

UPSET (FRAME)—Frame to increase the depth of a flask.

VENT—An opening in a mold or core to permit escape of steam and gases. Also called a vent hole.

VENT ROD—A piece of wire or bar to form the vents in sand.

VENT WAX—Wax in rod shape placed in the core during manufacture. In the oven the wax is melted out leaving a vent or passage.

VENTILATING SYSTEM—Equipment for supplying fresh, clean air and removing foul, dusty air.

VENTING—Act of making vents.

VIBRATOR—A device which jars or vibrates the pattern or matchplate as it is withdrawn from the sand.

WAX—Class of substances of plant, animal or mineral origin, insoluble in water, partly soluble in alcohol, ether, etc., and miscible in all proportions with oils and fats. They consist of esters, free fatty acids, free alcohols, and higher hydrocarbons. Common waxes are beeswax, paraffin wax, ozokerite, ceresin, carnauba. Mixtures of those are formed into rods and sheets and used for forming vents in cores and molds, repairing patterns, etc.

WEDGE—Piece of wood or metal which is thin at one end and thick at the other.

WEEPHOLE—A hole placed in a casting to permit drainage of moisture.

WELDING—Joining two pieces of metal together by heating until partial or complete fusion occurs.

WIND BELT—See air belt.

WIND BOX—See air belt.

WINDROW—A long pile of sand on the floor of a foundry.

WIRE BRUSH—Brush with bristles made of wire.

WIRE NAIL—Any one of several types of nails made from wire and designed for specific purposes such as finishing nails, box nails, etc.

WOOD FILLER—Finely ground or powdered wood. Also termed wood flour. That material mixed with a binder in paste form is used to fill holes and cracks in wood.

WOODWORKING MACHINERY—Lathes, jointers, saws, planers, and other tools designed for turning, cutting and finishing wood.

WORK HARDNESS—Hardness developed in metal from mechanical working, particularly cold working.

X-RAY—Form of radiant energy with extremely short wave length which has the ability to penetrate materials that absorb or reflect ordinary light.

YIELD POINT—The load per unit of original cross section at which a marked increase in deformation occurs without increase in load.

YIELD STRENGTH—The stress at which a material exhibits a specified limiting permanent stress.

ZINC—One of the elements whose chemical symbol is Zn. Its formula weight is 65.38; specific gravity 7.140; melting point 419.4 C.

ZIRCON—Natural zirconium silicate, $ZrSiO_4$, containing when pure 67.23 per cent zirconium oxide, ZrO_2, and 32.77 per cent silica, SiO_2.

ZIRCONIA—Zirconium oxide, ZrO_2.

ZIRCONIUM—One of the elements whose chemical symbol is Zr. Its formula weight is 91.22; specific gravity 6.4; melting point 1700 C.

This is the final installment of an extensive glossary of foundry terms compiled by Edwin Bremer from a wide variety of sources. In the development of this material a great amount of help has been secured from the *Steel Castings Handbook* published by the Steel Founders' Society of America, Cleveland; *American Malleable Iron* published by the Malleable Founders' Society, Cleveland, and from unpublished work of a Committee on Foundry Nomenclature of the American Foundrymen's Association, Chicago. THE FOUNDRY wishes to thank all sources from which this material has been obtained. THE EDITORS

REMOVING RISERS FROM MANGANESE BRONZE CASTINGS

By W. B. George
Metallurgist
R. Lavin & Sons Inc., Chicago

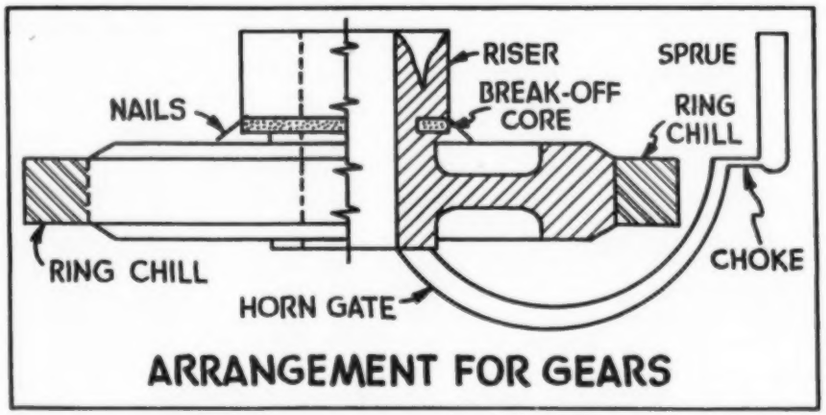
A PRACTICAL and tried method for removing risers from manganese bronze castings involves two fundamental facts which must be adhered to closely for successful results.

The first is that manganese bronze has a brittle range where it will snap readily. That is known as the pink range, and lies in color between the red and yellow exhibited by the casting surface as it cools. The brittle range varies with the composition of the alloy, and with the high tensile strength material it lies between 600 and 1000 F while on the 60,000 psi alloy the range narrows considerably, and is closer to 700 to 750 F. Should the casting become cold, it can be heated until the brittle range, pink in color, shows up on the riser side whereupon the riser may be snapped off.

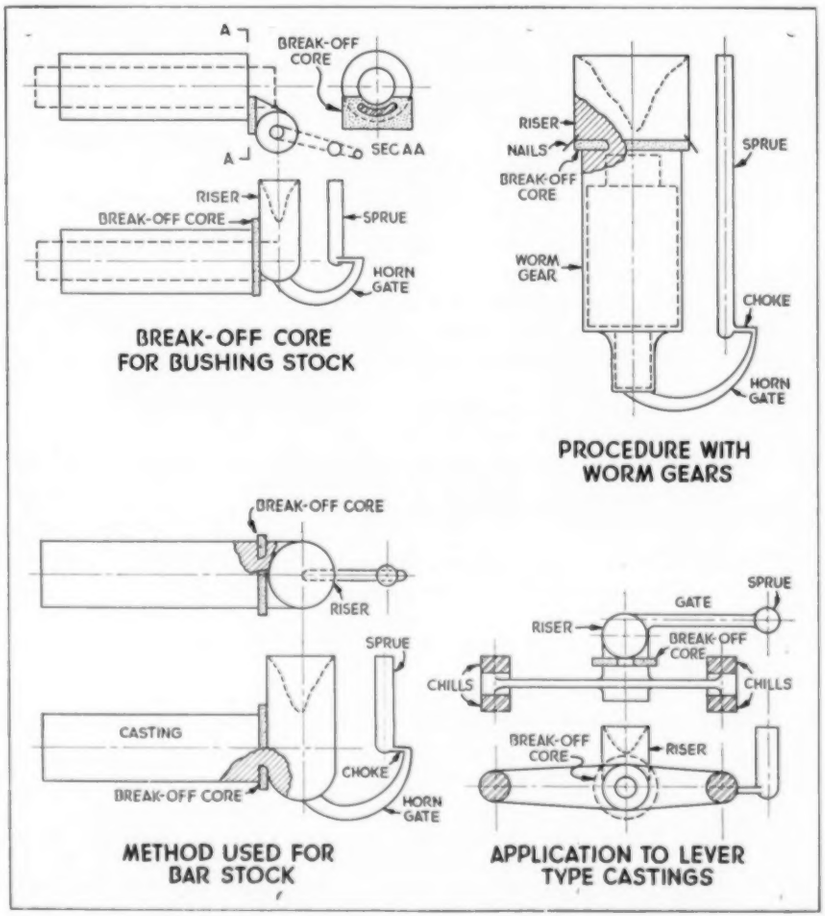
The second fact is that manganese bronze will feed through a restricted opening in a thin core almost as well as if the full diameter of the riser was applied. Core must be as thin as practicable so that it heats up rapidly to the metal temperature, and the thickness and hole size and shape will have to be determined experimentally.

Combination of those two facts enable foundrymen to snap off risers with a hammer resulting in enormous savings for those who have been able to adopt the procedure. Breaking off manganese bronze heads by that method has had a good try out on many hundreds of tons of castings. The author does not know of any patents being involved, and assumes no responsibility in passing on the information. The accompanying illustrations show various arrangements of break-off or neck-down cores.

From a discussion presented by the author at the Wisconsin Regional Foundry Conference held early this year at Milwaukee.



ARRANGEMENT FOR GEARS



BREAK-OFF CORE FOR BUSHING STOCK

PROCEDURE WITH WORM GEARS

METHOD USED FOR BAR STOCK

APPLICATION TO LEVER TYPE CASTINGS

For Your Production Foundry Install a

MILWAUKEE CORE GRINDER!

It Speeds Up Grinding Jobs

Milwaukee Core Grinder with 70" table in a midwest foundry. Note compact illustration.

Performs the Work of Several Men . . .

Here's a sturdy, labor-saving Core Grinder with ample adjustments for grinding small cores continuously or large cores (up to 72" in diameter) intermittently. Eliminates hand gauging of cores and does it more accurately, mechanically. No skilled labor required. Table can be rotated in either direction and wheel set on either side to fit into existing core handling systems. Equipped with oversize antifriction bearings and built with machine tool precision. Insures smooth, vibrationless performance. Truly an "all-purpose" machine adaptable to a wide range of work. Cuts labor costs. Adds to foundry efficiency. Pays for itself in a very short time. Write for bulletin No. 116.

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MILWAUKEE *Foundry Equipment Co.*

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Activities of foundry GROUPS

Central Indiana

CENTRAL Indiana Chapter of the AFA held its last meeting of the 1945-46 fiscal year May 20, at the Athenaeum in Indianapolis. New officers were elected at this meeting and are as follows: Chairman, J. P. Lentz, International Harvester Co., Indianapolis; vice chairman, William Ziegelmueller, Electric Steel Castings Co., Indianapolis; treasurer, Fred Kurtz, Electric Steel Castings Co., Indianapolis; secretary, Robert Langsenkamp, Langsenkamp - Wheeler Brass Works, Indianapolis.

Directors for 3-year terms include: Ray S. Davis, National Malleable & Steel Castings Co., Indianapolis; Ray Fickenworth, C & G Foundry & Pattern Works, Indianapolis; Allen Reed, General Refractories Co., Indianapolis; and William McClennon, American Foundry Co., Indianapolis. Howard Creps, Frank Foundries Corp., Muncie, Ind., will fill the unexpired term of former director William Ziegelmueller, the new vice chairman.

Following the election of officers, Bruce L. Simpson, president, National Engineering Co., Chicago, gave an excellent presentation of "The History and Development of the Foundry Industry." Tracing the foundry industry from 1700 B. C. to the present time, by means of reproductions and photographs, Mr. Simpson illustrated the fundamental importance of the industry and the dependence of our present mechanized age upon all forms of castings.

His enthusiasm and thorough research was forcibly reflected by the complete interest of the audience throughout the entire presentation and recommends the forthcoming book on the subject to the entire personnel of the foundry industry. A. W. Anderson, assistant foundry superintendent, International Harvester Co., Indianapolis, served as technical chairman of the meeting.—*B. P. Mulcahy, historian.*

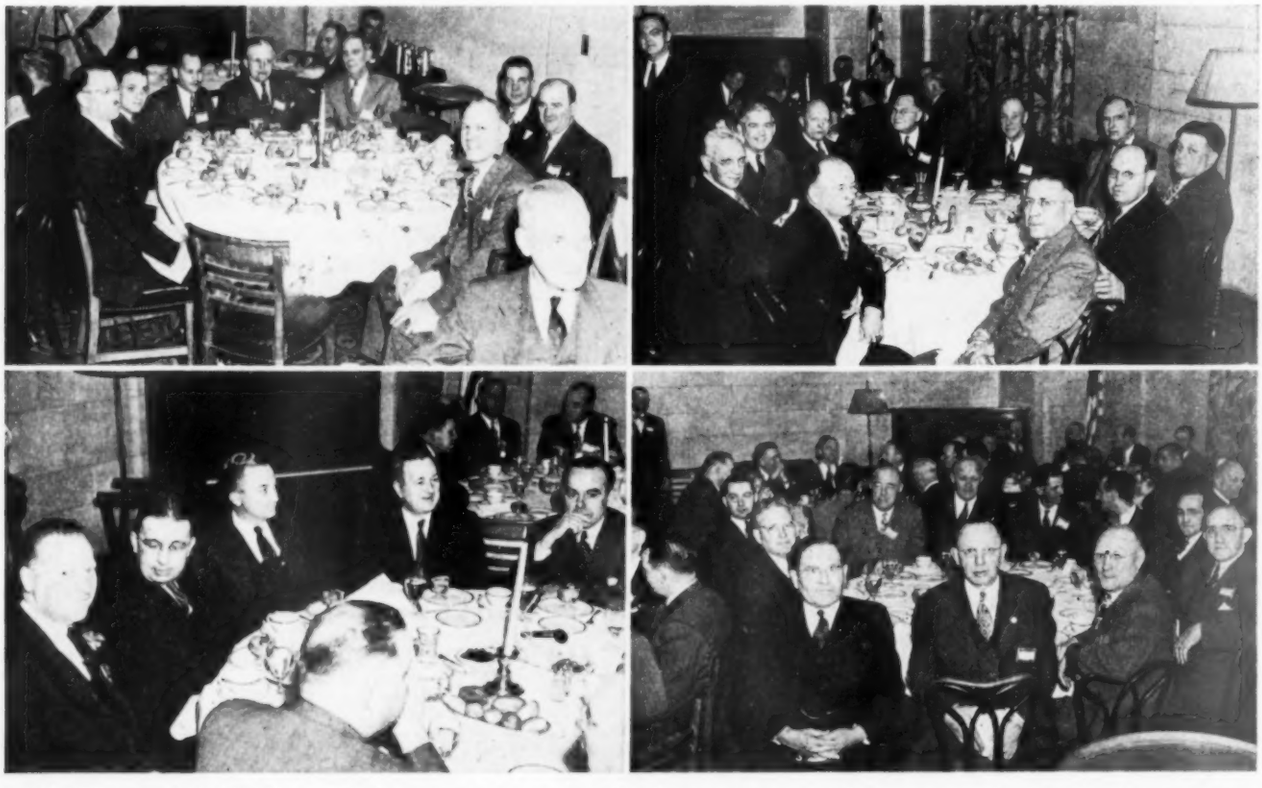
Chesapeake

AT THE May meeting of the Chesapeake Chapter of the AFA, held at the Engineers' Club, Baltimore, Howard Williams, sales manager of the New Jersey Silica Sand Co., Millville, N. J., presented a set of kodachrome slides showing the mining and processing of the various grades of sands used in the foundry industry.

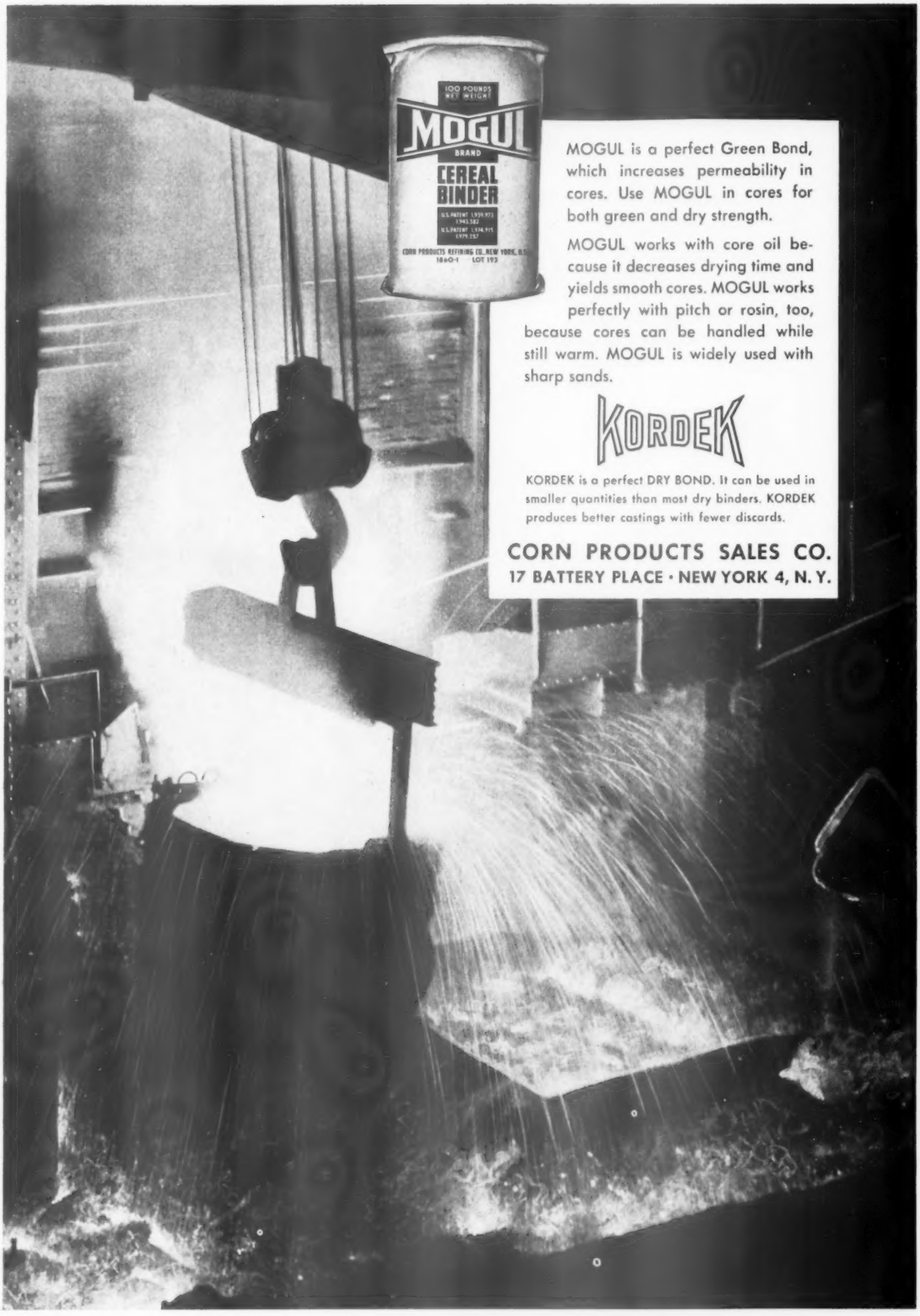
Mr. Williams explained the use of the various equipment as the slides were shown. He discussed the initial mining operations as well as the washing, grading and storage of the sands. In several instances, he explained how the laboratory control played a vital part in the production of sand having a uniform quality.

When the speaker had finished his presentation, Chapter Vice Chairman David Tamor, American Chain & Cable Co., York, Pa., presiding, called upon Chapter Director H. A. Horner, Frick

(*Continued on page* 175)



CHAPTER OFFICIALS: Views of the annual dinner of AFA chapter officers and directors at the Cleveland convention


100 POUNDS NET WEIGHT
MOGUL
BRAND
CEREAL BINDER
CORN PRODUCTS REFINING CO., NEW YORK, U.S.A.
1860-1 LOT 193
MOGUL is a perfect Green Bond, which increases permeability in cores. Use MOGUL in cores for both green and dry strength.
MOGUL works with core oil because it decreases drying time and yields smooth cores. MOGUL works perfectly with pitch or rosin, too, because cores can be handled while still warm. MOGUL is widely used with sharp sands.
KORDEK
KORDEK is a perfect DRY BOND. It can be used in smaller quantities than most dry binders. KORDEK produces better castings with fewer discards.
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Prevent *these Casting Defects*

BLOWS
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METAL PENETRATION
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SCABS
VEINING

THE DILATOMETER SHOWS BY THESE TESTS HOW SAND AND COATINGS WILL BEHAVE AT POURING TEMPERATURES

COLLAPSIBILITY
DEFORMATION
EFFECT OF ATMOSPHERES
EXPANSION AND CONTRACTION
GAS PRESSURE
GAS VOLUME
PERMEABILITY
PROTECTIVE COATING
REFRACTORINESS
SPALLING
STRENGTH

OTHER CASTINGS CONTROL EQUIPMENT—Other Dietert equipment which is minimizing scrapped castings in foundries throughout the country includes the Moisture Teller, the Permeability Meter, the Universal Sand Strength Machine, and others.

LABORATORY SERVICE—The services of a complete modern sand laboratory, the consultation of foundry specialists, are always available to you for the solution of difficulties you may encounter from day to day in your own work. The time to stop trouble is when it begins. Send defective samples promptly to the Detroit Laboratories before losses build up. This is a nonprofit operation maintained solely to assist you.

2080

HARRY W. DIETERT CO.

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(*Continued from page* 172)

Co., Waynesboro, Pa., to open the discussion. J. E. Crown, U. S. Navy Yard, Washington, and others also contributed to the discussion.—*William H. Baer, reporter.*

Pittsburgh

PITTSBURGH foundrymen heard Max Kuniansky, vice president, Lynchburg Foundry Co., Lynchburg, Va., and newly-elected vice president, American Foundrymen's Association, discuss "Cost Reduction Through Production Control" at the May meeting of the Pittsburgh Foundrymen's Association. His talk was divided into two main parts: (1) What is done at the Lynchburg Foundry Co. in running a foundry; (2) Manpower in the foundry.

Careful control exercised in the Lynchburg foundry is elaborate, he said, from the standpoint of both the metal and sand. Cupolas are equipped with dehumidifiers that control the humidity to 4 grains per cubic foot of air regardless of outside humidity. Mr. Kuniansky pointed out that the level of moisture is not as important as knowing what it is and keeping it uniform. Other practices at the company's foundry include desulphurizing in the ladle and inoculation of all irons. Sands are checked for permeability, hot strength, collapsibility, etc. Large amount of core work at the foundry requires careful control of core sands. Great care is also exercised to get good casting finish, since this is highly important at the consumer level.

Mr. Kuniansky stated there is a place for all cast irons, but irons must be used where they can best be used and not where someone wants to use them. Auto scrap must be cleaned of tin, lead, antimony and other undesirable elements before being melted.

Speaking of manpower, Mr. Kuniansky said that the foundry must be made a good place in which to work, a place of opportunity for young men. He said that mechanization can be carried to the ultimate, but good men are still needed. Production can be obtained and the foundry can still be a clean and livable place. It may be that capital expenditures will have to be made for heating equipment, dust collectors and exhaust equipment, but nevertheless to attract the needed type of men, this must be done.

He stressed the point that foundries must offer opportunity to newcomers, with constructive training programs to elevate level of the workmen.

There are certain management tools that will lower foundry costs and raise production, Mr. Kuniansky stated. These are:

1. Management should have a complete and accurate estimate process based on a good cost system. Bids ranging from $50,-

CENTRAL INDIANA: Scenes at May 20 meeting of Central Indiana Chapter, AFA, in Indianapolis. Speaker's table in top panel shows, left to right: J. P. Lentz, International Harvester Co., newly-elected chairman; R. S. Davis, National Malleable & Steel Castings Co., retiring chairman; A. W. Anderson, International Harvester Co., technical chairman; Bruce L. Simpson, National Engineering Co., meeting speaker; William Ziegelmueller, Electric Steel Castings Co., new vice chairman. (Photos courtesy B. P. Mulcahy, Citizens Gas & Coke Utility, Indianapolis)

000 to $132,000 on a single job is an indication of the lack of such information.

2. Good incentive systems should be installed in foundries, based on fair and accurate time studies. Day rates are passe and incentive systems are a must.

3. Management should make use of the camera and motion studies.

4. Management should make use of the art of work simplification. Jobs should be done in the best way possible with least effort.

5. Management should use methods engineering in the foundry.

6. All work should be based on a sound and intelligent personnel program. Men must be dealt with as men and not labor dealt with as a commodity.

The association held its annual golf party at the Alcoma Country Club, June 24. No meetings will be held throughout the summer months. The PFA will be 50 years old in September, and the program committee is planning the September meeting to honor all Pittsburgh area men who have been affiliated with the foundry industry in any capacity for 50 years or more.—*Joseph C. Sullivan.*

Detroit

AT THE May 16 meeting of the Detroit Chapter of the AFA, held in Rackham Educational Memorial, A. H. Allen, Detroit Editor, THE FOUNDRY, was elected chairman, to serve for the year 1946-47. Other officers elected include: Vice chairman, C. E. Silver, Michigan Steel Casting Co.; secretary, R. E. Cleland, Eastern Clay Products Co.; treasurer, W. W. Bowring, Frederic B. Stevens Inc.

Four new directors to serve three-year terms were also elected: Pierce Boutin, Pontiac Motor Division; E. J. Burke, Hanna Furnace Corp.; R. L. Orth, American Foundry Equipment Co.; and W. N. Seese, J. S. McCormick Co. Directors who were re-elected are: John E. Linabury, General Motors Corp.; Gordon C. Creusere, Semet-Solvay Co.; G. L. Galmish, Michigan Malleable Iron Co.; Omer L. Allen, Pontiac Motor Division; R. G. McElwee, Vanadium Corp. of America; G. Vennerholm, Ford Motor Co.; E. Lancashire, Detroit Steel Casting Co.; and J. P. Carrittee, True Alloys Inc. E. C. Hoenicke Foundry Division, Eaton Mfg. Co., is the retiring chairman and ex-officio board member.—*R. E. Cleland, secretary.*

Chicago

TO AVOID conflict with the AFA convention and show in Cleveland early in May, the Chicago Chapter deferred its final meeting of the 1945-46 season from the customary first Monday in the month to Friday, May 24. This switch ultimately gave uneasy moments to chapter officers, for the threatened rail strike forced the principal speaker to cancel his engagement upon relatively short notice, then to top matters off, 90 minutes before dinner was served the strike occurred, halting most of the commuting service in the Chicago area.

Despite these handicaps, however, the meeting went on at the Chicago Bar Association, and approximately 100 attended. "Castings in the Postwar Industry" was to have been the subject of the guest speaker so the program committee adhered to it and drafted a capable panel to pinch-hit. Outcome was a high-quality and interesting meeting.

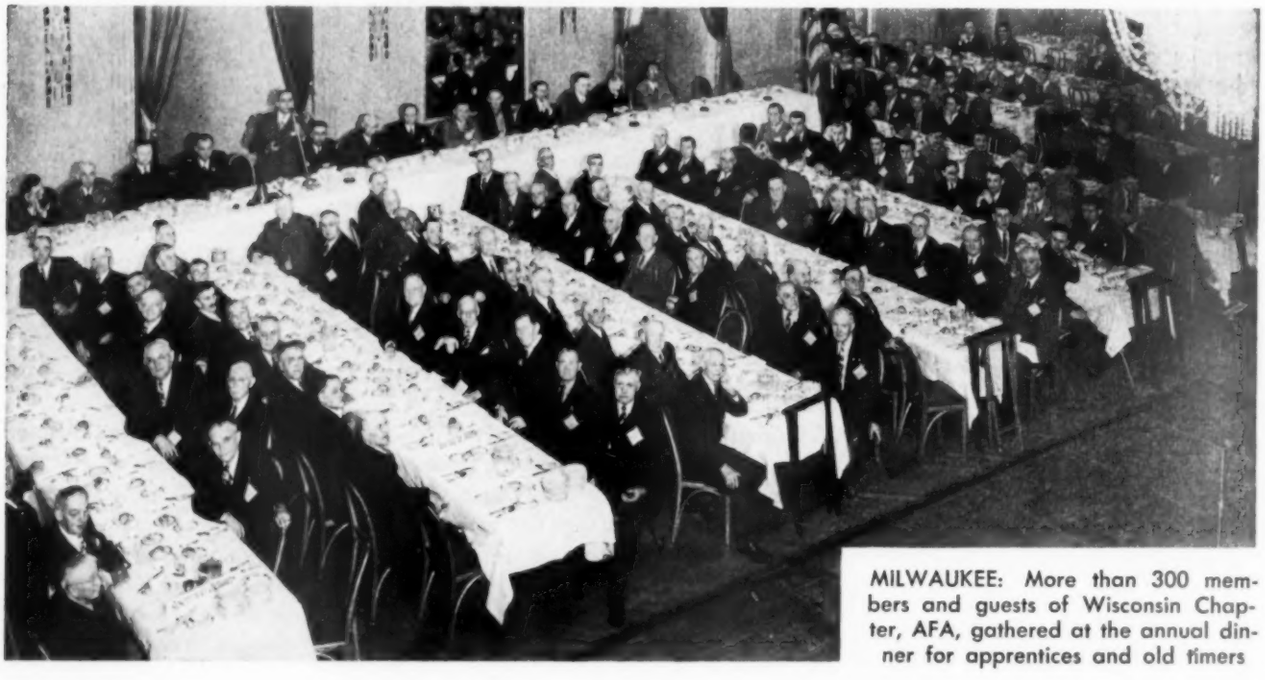
J. C. Gore, Chicago manager, Werner G. Smith Co., and chapter president, presided at the dinner and annual business session, and L. H. Hahn, metallurgical supervisor, Sivyer Steel Casting Co., Chicago, chapter vice president and chairman of the program committee, handled the technical program.

A. W. Gregg, executive engineer, foundry equipment division, Whiting Corp., Harvey, Ill., keynoted the topic of castings in postwar, placing emphasis on improvements that will benefit casting production and make the foundry a better place to work. The situation as to gray iron was handled by Eugene W. Smith Jr., foundry superintendent, Lindahl Foundry Division, American Gear & Mfg. Co., Chicago. He spoke of the advance of gray iron during the war, improved facilities now available, possibilities for economies in production, cleaning, etc.

S. C. Massari, a member of the national office staff of the AFA, reviewed the higher standards for castings and the part they will play in postwar industry. Oscar Blohm, chief metallurgist, Hills-McCanna Co., Chicago, discussed the nonferrous field, confining his remarks chiefly to magnesium and aluminum.

What does the foundryman want in the way of patterns, was the question posed by Harry J. Jacobson, owner, Industrial Pattern Works, Chicago. He described a questionnaire which his shop submits to the customer to provide all pertinent information. Martin Rintz, foundry superintendent, Continental Foundry & Machine Co., East Chicago, Ind., commented that

(*Continued on page* 178)



MILWAUKEE: More than 300 members and guests of Wisconsin Chapter, AFA, gathered at the annual dinner for apprentices and old timers

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For better, faster weld and casting cleaning, specify these portables . . .

These Sterling "Wheels of Industry" are rugged enough to stand up under the demands of any portable grinding job and, at the same time, provide better than usual service. They are made for each individual job . . have the correct bond, grain, structure, shape, and size to handle easily and efficiently on castings, welds, and other rough surfaces.

A wide range of finishes is possible, depending upon the specification selected for your particular job. Sterling engineers, skilled by years of experience on all types of portable grinding, can suggest the wheel for your use.

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THE WHEELS OF INDUSTRY

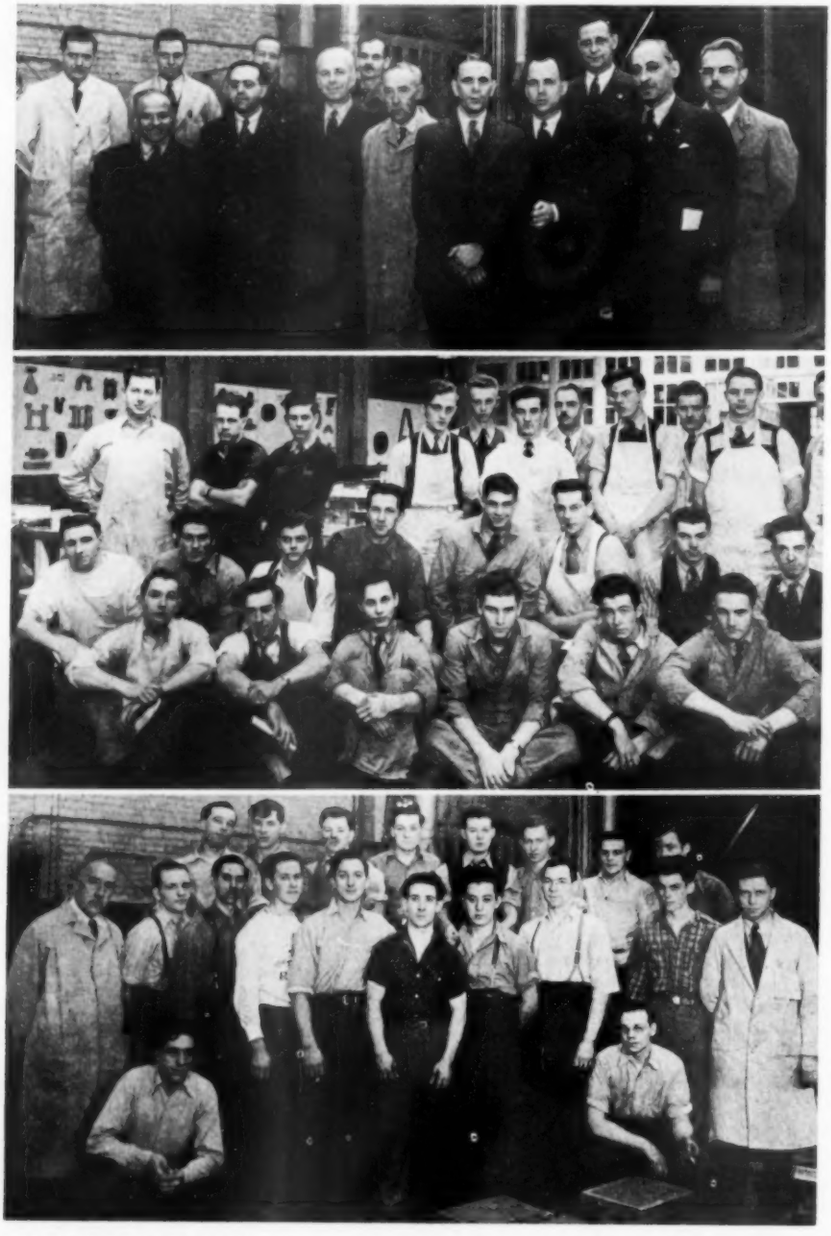
(*Continued from page* 176)
steel castings will have to compete more and more in the future with weldments and forgings, and thus must be made better. Fred B. Skeates, foundry superintendent, Link-Belt Co., Chicago, also contributed pertinent comments.

No additional nominations having been received by mail or from the floor to those reported a month previous, the nominating committee's recommendations for chapter officers for 1946-47 were accepted unanimously.

The new president is L. H. Hahn, metallurgical supervisor, Sivyer Steel Casting Co., Chicago, advanced from vice president; and Fred B. Skeates, foundry superintendent, Link-Belt Co., Chicago, is vice president. Leslie C. Smith, until recently associated with Peninsular Grinding Wheel Co., was re-elected secretary. The office of treasurer, now occupied by Bruce L. Simpson, president, National Engineering Co., Chicago, is appointive by the board of trustees.

New directors for three years are: C. V. Nass, vice president, Pettibone-Mulliken Corp., Chicago; D. H. Lucas, manufacturer's sales representative, Chicago; H. K. Swanson, owner Swanson Pattern & Model Works, East Chicago, Ind.; and Retiring President J. C. Gore.

Chapter will hold its annual outing in late summer, with time and place yet to be announced.—*Erle F. Ross.*



APPRENTICE CONTEST: Sponsors and participants in the 1946 apprentice contest conducted by the Eastern Canada and Newfoundland Chapter of the AFA at the Montreal Technical School. Top panel, showing members of the chapter's educational committee, includes: *First row, left to right*—Messrs. Delorme, Beaupre, Dussault, Cotteur, Cartwright, Fransis and Louette; *Second row, left to right*—Messrs. Delorme, Couture, Vervais, Allard, Nuttall and Prunier. Middle panel shows entrants in the patternmakers group of the contest, while the bottom panel includes participants in the apprentice molding contest

Central Illinois

ONE hundred twenty-seven members and guests of the Central Illinois Chapter of the AFA were present at the last meeting before adjourning for the summer months. The meeting was held May 20 at the Jefferson Hotel, Peoria, Ill., at which time W. A. Hambley, metallurgical superintendent of Allis-Chalmers Mfg. Co., Milwaukee, spoke on "Casting Defects."

At a business meeting held before the program Joseph E. Kolb, Caterpillar Tractor Co., who was recently elected a national director of the AFA, was introduced to the group. Carl W. Wade, Caterpillar Tractor Co., gave the secretary's report and commented on the splendid progress the chapter has made in its first year and outlined plans for the coming year. A. V. Martens, Pekin Foundry & Mfg. Co., treasurer, also gave his report.

The slate of the nominating committee was voted upon and unanimously accepted. Officers for the coming year are: Chairman, Zig Madacey, Caterpillar Tractor Co.; vice chairman, Al Martens, Pekin Fdry. & Mfg. Co.; secretary-treasurer, Carl W. Wade, Caterpillar Tractor Co.

Directors, three-year term: F. W. Shipley, Caterpillar Tractor Co.; Ed Roby, Peoria Malleable Castings Co.

Directors, two-year term: V. W. A'Hearn, Midwest Pattern Works; C. Buckler, Superior Foundry. Directors, one-year term: Adolph Klawitter, Peoria Foundry Division, M. H. Deterick Co.; Prof. C. E. Schubert, University of Illinois.

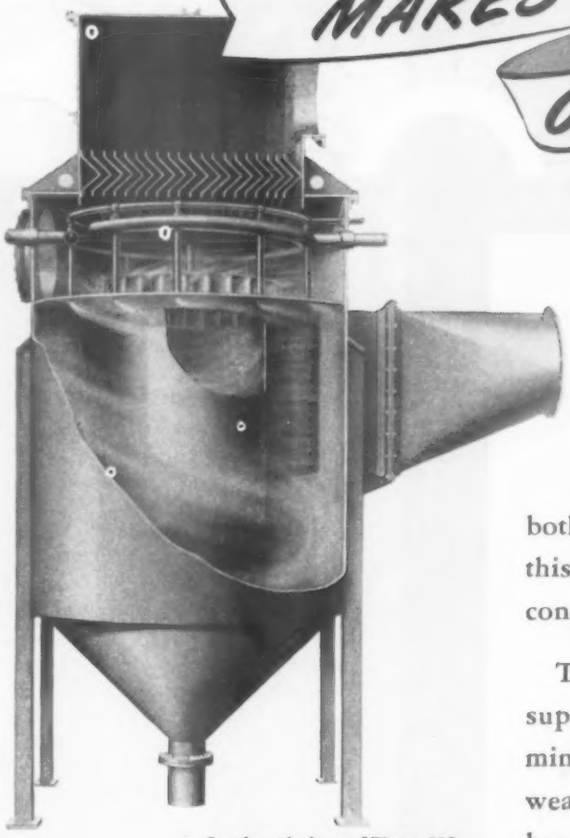
Ed Roby, chairman, next introduced Mr. Hambley who briefly outlined the growth of the AFA in the last ten years and congratulated the Central Illinois Chapter on its enthusiasm. Mr. Hambley, who is chairman of the Committee for the Analysis of Gray Iron Casting Defects, told his audience that he has been interested in casting defects for a number of years. The committee was set up to study defects, define them, outline their causes and try to suggest remedies. He stated that the work of his committee is to be published shortly.

Mr. Hambley listed ten of the thirty separate defects found in castings. He also named ten operating causes which contribute to scrap and elaborated on these factors with regard to definition and cause, also suggesting some remedies. He said

(*Continued on page* 180)

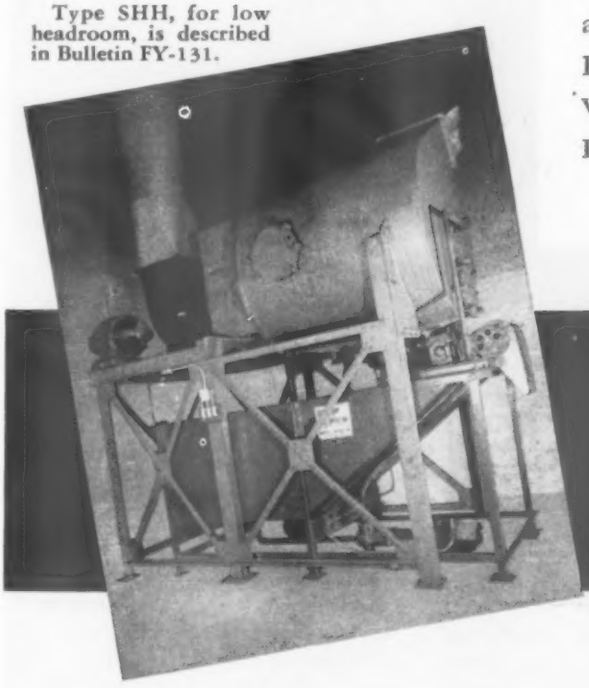
HYDRO-CLONE

MAKES FOUNDRIES CLEANER, BETTER



Sectional view of Type SH Hydro-Clone, commonly used in foundries.

Type SHH, for low headroom, is described in Bulletin FY-131.



Hydro-Clone dust suppressors efficiently remove dust from sand handling and conditioning operations, shakeouts, tumblers, grinders, etc.—by suppressing both fine and heavy dust with water. Obviously this makes for cleaner, more pleasant working conditions and raises worker morale.

The Hydro-Clone is a simple, efficient dust suppression unit designed to operate with minimum attention. It has no moving parts to wear out, no spray nozzles to clog, no cloth bags or screens to break through or require cleaning. Specialized designs are available for all types of foundry dust control. Write for Bulletin FY-126 for additional information. Whiting Corporation, 15607 Lathrop Ave., Harvey, Illinois.

WHITING

HYDRO-CLONE EQUIPMENT

"Wetting is true suppression"

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, and Washington, D. C. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church Street, New York 7, New York.

(*Continued from page* 178)
that defects are divided into three parts: Those which cause a total loss, those requiring major repairs, and those requiring minor repairs.

Mr. Hambley showed a series of slides illustrating the points he had emphasized earlier. The group asked questions and an informal discussion period was held. Because of his extensive knowledge of the subject of discussion, Mr. Hambley was able to clearly explain all phases of casting defects. His enthusiasm concerning his subject was quickly noticed by his audience.

Before adjourning the meeting, chairman Roby expressed his thanks to the chapter members for their willing cooperation during the past year.—*Carl W. Wade, secretary.*

OLD TIMERS: Participants in Old Timers' Night of the Northern Illinois and Southern Wisconsin Chapter, AFA, held at Rockford, Ill., May 14. (Photos courtesy of John Bing, A. P. Green Fire Brick Co., Milwaukee)

Eastern Canada and Newfoundland

ABOUT 500 members and guests of the Eastern Canada and Newfoundland Chapter of the AFA attended a smoker and entertainment held Apr. 26 in the ball room of the Mount Royal Hotel, Montreal. The entertainment committee of the chapter arranged the event as a substitute for the annual stag dinner to overcome the difficulty of catering to a large group by the hotel management.

G. Ewing Tait, chapter chairman, welcomed the gathering and turned the evening over to J. Newman, chairman of the entertainment committee, who was assisted by E. Laurendeau, A. Hughes, E. Jennings, J. Shewan, R. Scott, L. Beaudry, P. Savoie, J. McVey, O. L. Voisard, R. Cameron, and L. Guillemette.

Several boxing bouts were put on by youthful members of the Griffintown Boys' Club, which proved to be very interesting. An excellent program was supplied by professional performers and many of the acts were repeatedly encored. A liberal supply of sandwiches, olives, celery, cheese and crackers and liquid refreshments was dispensed throughout the evening.

The committee was congratulated on the success of the entertainment and it is expected that the smoker will be repeated next year.—*G. D. Turnbull, publicity chairman.*

Philadelphia

LAST seasonal meeting of the philadelphia Chapter of the AFA was held May 24 at the Engineers' Club. Despite the railroad strike the meeting was well attended, and the members were fortunate in having three capable speakers.

John Erler, consulting metallurgist, Farrel-Birmingham Co. Inc., Ansonia, Conn., made a plea for greater co-operation between designer, foundryman and inspector. Mr. Erler showed, with the use of slides, examples of unnecessary casting failures, and pointed out that through ignorance of application and of critically stressed areas foundrymen frequently produce a nonserviceable product. He suggested that foundrymen work in unison to establish principles which

(*Continued on page* 182)

Electro HIGH SPEED SNAGGING

ALUMINUM CASTINGS

ALLOY STEEL BILLETS

ALLOY STEEL CASTINGS

STAINLESS STEEL BARS

BRASS CASTINGS

LOW CARBON STEEL CASTINGS

BRONZE CASTINGS

HIGH SPEED STEEL BILLETS

ALUMINUM BRONZE BILLETS

HIGH CARBON STEEL BARS

ANNEALED MALLEABLE CASTINGS

STEEL FORGINGS

MAGNESIUM CASTINGS

GRAY IRON CASTINGS

MANGANESE CASTINGS

Frictional heat is no problem with Electro High Speed Snagging Wheels. Long, heat-generating contact is entirely foreign to them. They travel fast. Bite quick and hard. Knock excess metal from castings, forgings, billets, and slabs. Withstand abuse. Defy mechanical and thermal shocks. They work in portable machines, swing frames or floor stands to increase production, save time and cut costs. We'll gladly send an engineer to prove all claims in an operating demonstration.

To purchasing and production executives, we'll gladly send a copy of our new grinding wheel manual, the most talked-of catalog in industry. Write us NOW!

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PAST PRESIDENTS: Harry E. Ladwig (left), Allis-Chalmers Mfg. Co., Milwaukee, 1944-45 president of the Wisconsin Chapter, AFA, presents the president's ring to John Bing, A. P. Green Fire Brick Co., Milwaukee, who has just completed a term as president of the chapter

(*Continued from page* 180)

will aid the designer and foundryman.

Graham T. Hassard, general superintendent, Farrel-Birmingham Co. Inc., gave a very interesting and complete discussion covering manufacture of large gray iron castings. He compared costs and results in the use of full patterns and corebox assemblies, and definitely favored corebox assmeblies in all of the cases he discussed, reporting improved quality and lower costs.

Technical Chairman John Howe Hall, steel foundry consultant, Swarthmore, Pa., added numerous sidelights to the subjects discussed and brought many questions from the floor during an interesting discourse.

Newly officers of the chapter who will serve during the year 1946-47, were announced. They are: Chairman, B. A. Miller, Cramp Brass & Iron Foundries Division, Baldwin Locomotive Works, Eddystone, Pa.; vice chairman, E. C. Troy, Dodge Steel Co., Philadelphia; secretary-treasurer, W. B. Coleman, W. B. Coleman Co., Philadelphia. Directors to serve for three years are: William Morley, Olney Foundry Division, Link-Belt Co.; and A. C. Gocher, Fletcher Works Inc.—*E. C. Troy.*

NEW OFFICERS: Officials recently chosen by the Northern Illinois and Southern Wisconsin Chapter, AFA, include, left to right: President, John Doerfner, Gunite Foundries Corp.; vice president, John T. Clausen, Greenlee Bros. & Co.; treasurer, Lester Fill, Geo. D. Roper Corp., all of Rockford, Ill. Secretary is Herbert Bauman, Ebaloy Foundries Inc. (Photo courtesy of John Bing, A. P. Green Fire Brick Co., Milwaukee)

Western Michigan

WESTERN Michigan Chapter of the AFA closed its 1945-46 season May 13, with a dinner meeting in the Occidental Hotel, Muskegon. C. E. Westover, consultant management engineer, Milwaukee, was the guest speaker.

Rudolph Flora, Clover Foundry Co., Muskegon, was elected chairman of the chapter for the 1946-47 year, which will open in October. Other officers named to serve include: Charles H. Cousineau, West Michigan Steel Foundry Co., Muskegon, vice chairman; Victor A. Pyle, Pyle Pattern & Mfg. Co., Muskegon, secretary; and Arthur H. Green, Dake Engine Co., Grand Haven, treasurer. Named to the board of directors for three-year terms are: Otto Frank, Sparta Foundry Co., Sparta; W. A. Hallberg, Lakey Foundry & Machine Co. Inc., Muskegon; and Paul Johnson Sr., Grand Haven Brass Foundry, Grand Haven.

A stag picnic will be held at the Spring Lake Country Club, in August. Membership of the chapter now is close to 350.

Northwestern Pa.

REGULAR monthly meeting of the Northwestern Pennsylvania Chapter of the AFA was held May 27 at the Moose Club, Erie, Pa., with 100 members and guests in attendance. Speaker of the evening was Bruce L. Simpson, president, National Engineering Co., Chicago, who presented an interesting talk on "History and Development of the Foundry Industry."

Mr. Simpson discussed the methods used in the foundries of olden days where manual labor was necessary for all operations, as compared with the present time when newly installed modern methods have made foundry jobs comparable in effort required to other manufacturing operations. He stated that the time is drawing near when all foundries will have modern equipment which will make them the best of places in which to be employed. The speaker stated that creating things is the most interesting of professions and practically everything used today is from the creation of some part made in the foundry. Mr. Simpson's talk on "History and Development of the Foundry Industry" has received wide acclaim and is being printed in book form to make it available to all interested in the foundry business.

A singing quartet composed of Jack

(*Continued on page* 184)

PROMPT DELIVERY

on "Industrial" Fabricated

Steel Flasks and Slip Jackets

★ *Parting Line* on cope and drag is surface-ground for accurate fit.

★ *All-Welded* construction from hot-rolled steel plate.

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SLIP JACKETS

Accurate and light weight, you will find our slip jackets durable and made as you specify.

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INDUSTRIAL FABRICATING, Inc.

TELEPHONE 6781

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(*Continued from page* 182)

Gill, patternmaker, Bailey Harrington, a peddler, George Heiser, a foundry foreman, and Earl Strick, finishing superintendent, accompanied by Courtney Wilcox, production manager, Cascade Foundry, made its first appearance and was received with wide acclaim. The quartet, known as "The Foundriers," was generous in its renditions, singing five encores in response to the applause it received.

Annual election of officers was held at this meeting and Earl M. Strick, Erie Malleable Iron Co., was chosen chairman for 1946-47. Other officers include: Vice chairman, John Clarke, General Electric Co.; secretary, Harry L. Gebhardt, United Oil Co.; and treasurer, Douglas James, Cooper-Bessemer Corp., Grove City, Pa.

Directors elected for three years: George Johnstone, Cooper-Bessemer Corp., Grove City; Joseph Shuffstall, National Erie Corp.; and John Gill, Lake Shore Pattern Works. Directors for two years: Clarence Fitts, Hays Mfg. Co.; Tom M. Beaulac, Chicago Pneumatic Mfg. Co., Franklin, Pa.; and Fred J. Eisert, Urick Foundry Co. Directors for one year: Roger Carver, Standard Stoker Co.; J. S. Hornstein, Meadville Malleable Iron Co.; William Miller, Frederic B. Stevens Inc.; and Roger W. Griswold Jr., Griswold Mfg. Co.

Tribute was paid to Roger Griswold, first president of the chapter, for the time and effort he has spent in making the year's activities long to be remembered, and a rising vote of thanks, with much applause, was given him as he turned the gavel over to his successor.—*Earl Strick, reporter.*

PHILADELPHIA: Audience and speakers at the season's last meeting of Philadelphia Chapter, AFA. At the bottom, left to right, are: Graham T. Hassard, Farrel-Birmingham Co., Ansonia, Conn.; John Howe Hall, steel foundry consultant, Swarthmore, Pa., and John Erler, Farrel-Birmingham Co.

Reading

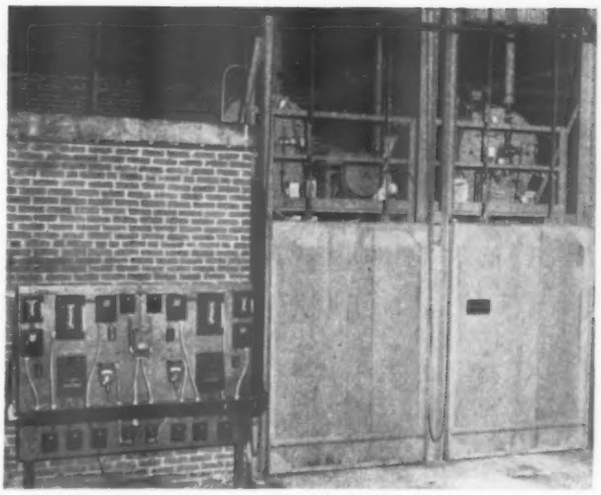
IN a talk before the Reading Foundrymen's Association, May 21, J. S. Vanick, metallurgist, International Nickel Co. Inc., discussed "Recent Trends in Foundry Metallurgy." Mr. Vanick pointed out that productive capacity in gray iron, steel, malleable iron and bronze had not been excessive. It expanded during the war, but increased postwar demands could easily keep existing capacity busy for a long time into the future.

Metallurgical processes in the foundry industry followed a simplicity common to all melting practices in that metal mixtures were melted down from available raw materials, refined, conditioned, alloyed, given finishing refinement or treatment, heated to and poured at controlled temperatures, the speaker said. Much progress was made in applying well known laws of physics on heat transfer to production of sound castings of high quality.

Mr. Vanick believes that peacetime operations will benefit from wartime experiences. For example, new invasions of the domain of high and low temperatures have been made. Low temperatures encountered by aircraft at high altitude focuses attention upon alloyed steels retaining toughness at these low temperatures, and chemical process and refrigeration industries in peacetime find castings which will hold their toughness necessary for temperatures down to 200-300 F below zero. Similarly, high temperature exposure of metals in jet propulsion and aircraft supercharger systems finds peacetime uses in power generating equipment operating at temperatures of 450 to 1100 F for cast steels, cast irons and special alloys which will hold their strength.

Production of gray iron, steel, malleable iron and bronze castings, which develop high strengths in the as-cast condition without need for complicated heat treatments, were emphasized as attractive methods for foundrymen to follow in developing advantages which casting compositions possessed. Cast steels of high

(*Continued on page* 186)



Two Recirculating Oil Fired Double Rack Type Core Ovens with Lift Doors, as installed for The Crucible Steel Castings Co., Lansdowne, Pa.

CARL-MAYER OVENS

The Choice for DESIGN, PERFORMANCE

FOUNDRY owners and engineers are quick to recognize the value of outstanding engineering features available in Carl-Mayer oven design.

This is proven by the fact that leading concerns like those listed below, order Carl-Mayer Ovens repeatedly in face of wide foundry oven competition.

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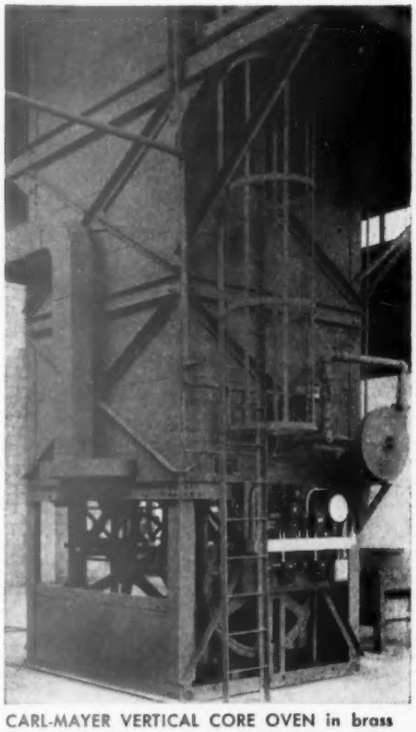
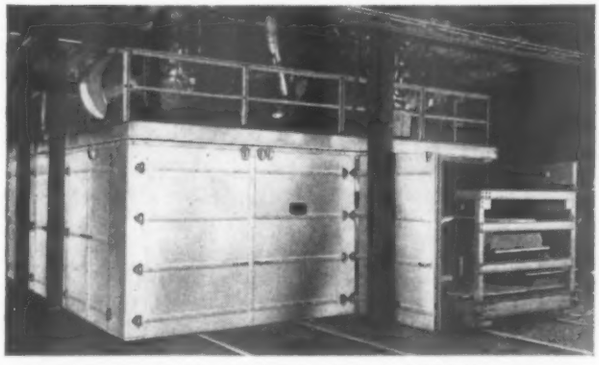
General Steel Castings Co.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
H. B. Salter Co.
Shenango Penn Mold Co.
Studebaker Corp.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.



CARL-MAYER VERTICAL CORE OVEN in brass foundry of The H. B. Salter Co., Marysville, Ohio, manufacturers of heating and plumbing fixtures.



CARL-MAYER TWO COMPARTMENT CAR TYPE OVEN for cores and molds. Also has doors on side permitting its use as a rack type oven.

EXPERIENCE—For more than 25 years, Carl-Mayer Oven Engineers have brought forth outstanding developments for fast baking, uniform baking and fuel economy. Therefore, when you choose Carl-Mayer oven equipment you are assured of the best in all around operating efficiency.

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BIRMINGHAM, ALA.—Safety Engineering & Supply Co.
BOSTON, MASS.—Cutter, Wood & Sanderson Co.
BUFFALO, N. Y.—American Allsafe Co.
BUTTE, MONT.—Montana Hardware Co.
CASPER, WYO.—Casper Supply Co.
CHARLESTON, S. C.—Cameron & Barkley Co.
CHARLESTON, W. VA.—Safety First Supply Co.
CHATTANOOGA, TENN.—C.D. Genter Co.
CHICAGO, ILL.—Protective Equipment, Inc.
CINCINNATI, OHIO—The E. A. Kinsey Co.
CLEVELAND, OHIO—Safety First Supply Co.
COLUMBUS, OHIO—The E. A. Kinsey Co.
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DEADWOOD, S. DAK.—Hendrie & Bolthoff Mfg. & Supply Co.
DENVER, COLO.—Hendrie & Bolthoff Mfg. & Supply Co.
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GRAND RAPIDS, MICH.—F. Raniville Co.
GREENSBORO, N. C.—Smith-Courtney Co.
GREENVILLE, S. C.—Carolina Sup. Co.
HICKORY, N. C.—Smith-Courtney Co.
HOUSTON, TEXAS—Allied Safety Equipment Co.
INDIANAPOLIS, IND.—The E. A. Kinsey Co.
JACKSONVILLE, FLA.—Cameron & Barkley Co.
KANSAS CITY, KANS.—L.R. Stone Supply Co.
LOS ANGELES, CALIF.—E. D. Bullard Co.
LOUISVILLE, KY.—Neill-LaVielle Sup. Co., Inc.
MEMPHIS, TENN.—J. E. Dilworth Co.
MILWAUKEE, WIS.—Protective Equip., Inc.
MUSKEGON, MICH.—Factory Supply Co.
NEW ORLEANS, LA.—Woodward, Wight & Co., Ltd.
NEW YORK, N. Y.—W. S. Wilson Corp.
OKLAHOMA CITY, OKLA.—Hart Industrial Supply Co.
OMAHA, NEBR.—Interstate Mach. & Sup. Co.
PHILADELPHIA PA.—Industrial Prod. Co.
PITTSBURGH, PA.—Safety First Supply Co.
PORTLAND, ORE.—J. E. Haseltine & Co.
PROVIDENCE, R. I.—James E. Tierney
RICHMOND, VA.—Smith-Courtney Co.
ST. LOUIS, MO.—Safety Incorporated
ST. PAUL, MINN.—Farwell, Ozmun, Kirk & Co.
SALT LAKE CITY, UTAH—Industrial Supply Co., Inc.
SAN FRANCISCO, CALIF.—E. D. Bullard Co.
SANTA FE, N. MEX.—Hendrie & Bolthoff Mfg. & Supply Co.
SAVANNAH, GA.—Cameron & Barkley Co.
SCRANTON, PA.—L. B. Potter & Co.
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SPOKANE, WASH.—J. E. Haseltine & Co.
SPRINGFIELD, MASS.—Charles C. Lewis Co.
SYRACUSE, N. Y.—Syracuse Supply Co.
TACOMA, WASH.—J. E. Haseltine & Co.
TAMPA, FLA.—Cameron & Barkley Co.
TROY, N. Y.—The Troy Belting & Sup. Co.
TULSA, OKLA.—Hart Ind. Supply Co.
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DOUBLE WILLSON

PRODUCTS INCORPORATED
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(*Continued from page* 184)

hardenability, and gray irons and bronzes possessing high strength in the as-cast condition, were indicated as tools by means of which foundrymen could expand the uses of their products.

Central New York

CHAIRMAN E. G. White presided at the monthly dinner meeting of the Central New York Chapter of the AFA, held May 17, at the Onondaga Hotel, Syracuse. After a brief business session Mr. White presented Bruce Artz, Pangborn Corp., Hagerstown, Md., a chapter member, who discussed various types of casting cleaning equipment, outlining the merits of each particular method.

Mr. Artz was assisted by A. L. Gardner, advertising manager of Pangborn Corp. Mr. Artz used slides and a short movie film to illustrate the improvement that has been made in casting cleaning processes from the first crude sandblast equipment to airless barrels and rooms, water cleaning and special installations for specific jobs.

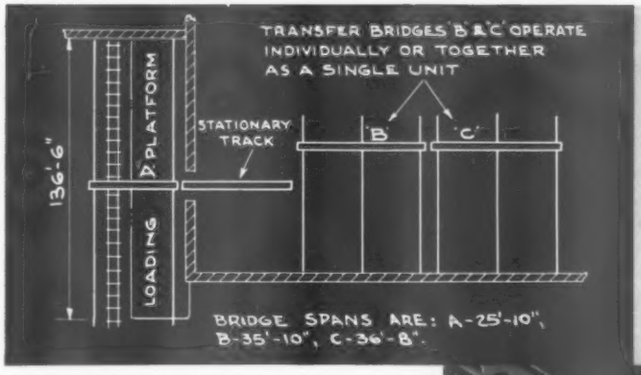
Both of the speakers pointed out that in recent years dust has been practically eliminated from cleaning departments, heavy work is being handled mechanically and castings are being cleaned more thoroughly than heretofore. A lively discussion period followed the talks, and questions presented by members of the group were answered by Mr. Gardner and Mr. Artz.—*J. A. Feola, reporter.*

Northeastern Ohio

OLD Timers' Night of the Northeastern Ohio Chapter of the AFA held at the Cleveland Club May 23, attracted a near-capacity crowd of 335 members and guests. The guests, in addition to 130 industry veterans with service records of 40 or more years, included a number of prize-winning apprentices.

A. C. Denison, chapter president, presided at this the last meeting of the 1945-46 season and introduced the various winners in the local apprentice contest. Checks were presented by Mr. Denison and Harvey E. Ennis, secretary, Associated Industries of Cleveland, to the successful contestants who included: John Pietrzyki Crucible Steel Casting Co., second-place winner in the National AFA contest; Steve Grabowski, Meech Avenue Foundry; Harold Young, Cleveland Trade School; Robert Bina, Crucible Steel Casting Co., national first-prize winner; Sam Colombo, Crucible Steel Casting Co.; Jim Kraynak, West Steel Casting Co., na-

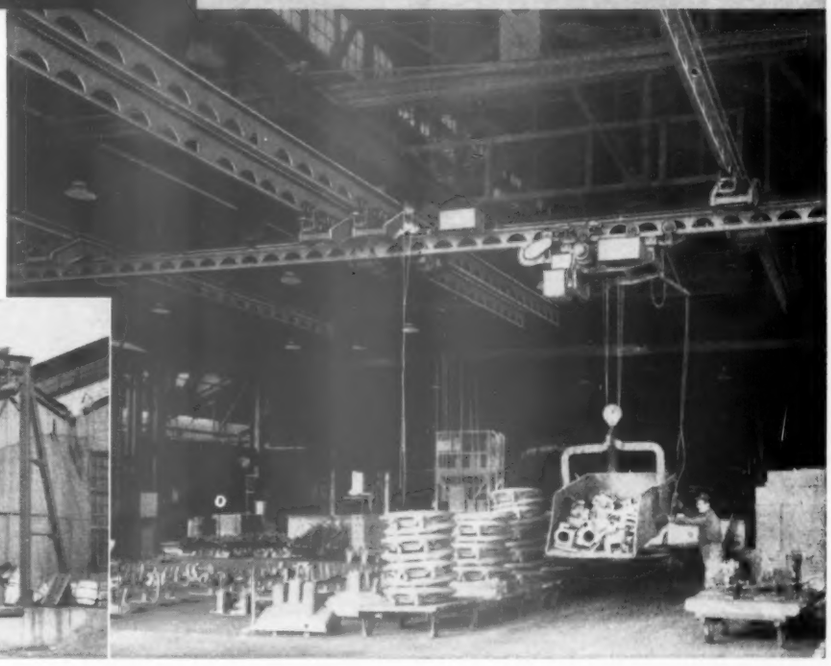
(*Continued on page* 188)

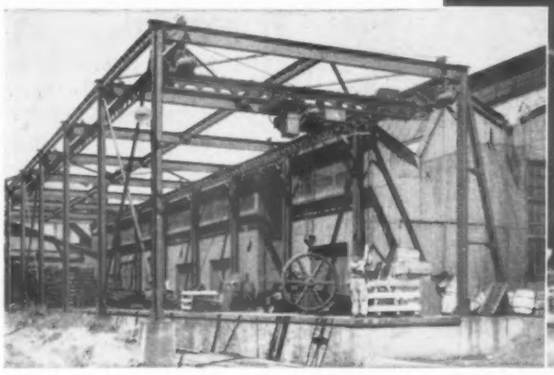


5 TON TRANSFER BRIDGE SYSTEM with Advanced Features

(At right) The two inside bridges are shown interlocked and being operated as a single unit. Either bridge may be operated individually. All control is centralized in the push button station suspended from the carrier.

(Below) The outside bridge serving the loading dock interlocks with inside track at doorway.





CASTINGS can be picked up at any point in the large shipping room, and loaded onto railroad cars or trucks at the outside of the building with this efficient 5-ton transfer bridge system. The bridges and stationary track interlock, enabling the motor-driven carrier to operate on any bridge.

The two inside bridges can be operated individually or together as a single unit, and controlled completely by means of the pendant push-button station on the carrier. This permits operating the bridges separately for local work in the bays each covers. When transporting materials from one bay to the other, time is saved by operating the bridges interlocked as a single unit because then it is not necessary to travel the bridges extra distances in order to interlock them for transfer of a carrier.

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While DUST HOG fattens on inefficiency, slowing up workers, ruining machinery, spoiling quality, causing accidents—maintenance costs go up. So the cost of *controlling* dust can usually be paid for out of savings in maintenance—and often by reclaiming dust by-products.

Clear out those "dust pockets" where DUST HOG is adding to your costs. A free booklet, "Control of Industrial Dust", shows how "plant housekeeping" is easier, cheaper with Pangborn equipment on the job. Write Pangborn Corporation, 284 Pangborn Boulevard, Hagerstown, Maryland—*world's largest manufacturer of dust control and blast cleaning equipment.*

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

(*Continued from page* 186)

tional third-prize winner, and Frank Alabise, West Steel Casting Co.

Concluding business of the meeting was the election of officers and directors for 1946-47. The new slate includes: President, Henry J. Trenkamp, Ohio Foundry Co.; vice president, Bruce Aiken, Crucible Steel Casting Co.; secretary, Gilbert J. Nock, Nock Fire Brick Co.; treasurer, F. Ray Fleig, Smith Facing & Supply Co. Directors named to serve for three years are Vincent Sedlon, Master Pattern Co.; Walter E. Sicha, Aluminum Co. of America; C. S. Winter, Duplex Mfg. & Foundry Co., Elyria, O.; Fred J. Pfarr, Lake City Malleable Co., and William G. Gude, THE FOUNDRY.

Remainder of the evening was given over to entertainment arranged by the chapter's perennial entertainment arranger, L. P. Robinson.—*William G. Gude.*

Wisconsin

AT THE May 16 dinner meeting of the Wisconsin Chapter of the AFA, held in the Crystal Ball Room of the Hotel Schroeder, Milwaukee, old-time foundrymen and apprentices were the guests of the chapter. Practically the entire evening was given over to a good time for the guests.

The program also included installation of new officers, during which John Bing, retiring president, in a short talk thanked his fellow officers for their assistance during the past year, and also said kind words for the way the members had attended meetings and participated in the discussions. David Zuege, incoming president, replied that he knew that he would receive the same co-operation as past presidents had enjoyed.

Then attention was given to the old timers and newcomers in the foundry field of Wisconsin. To be an old timer in the meaning of the words for this chapter requires activity in foundry work for 50 years, and a checkup showed about fifty men so credited. Some were plant men during the entire period of foundry employment, including superintendents, foremen and other key men, while several were officials in the business end.

Seventeen newcomers among the 50-year men were given plaques, which looked as though the base was made by a good patternmaker, with a bronze plate attached, giving evidence of the recipient's long service as a foundryman.

Nine foundry apprentices were also among the guests at this meeting, all being winners for 1946 in a local contest—three in patternmaking, and the same number each in iron molding and brass work. These men were the subject of a com-

(*Continued on page* 190)

Always "UP TO PAR"

The foundry superintendent of a heavy machinery making plant writes:

"Your core oil has met every demand that I have required of it in our iron and brass foundries. I have used this oil for many years exclusively, and have never found one barrel that has not been up to par. I do not experience any trouble with smoke or gas in our foundries, when pouring off. I highly recommend Certified Core Oil for light and heavy cores of all kinds."

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Uniform quality is a characteristic of Certified Core Oil which is always appreciated by its users. This highly important uniformity is maintained by close laboratory control of production.

The satisfaction expressed in the above letter reflects added advantages of Certified Core Oil in addition to the usual proper grain coating, clean working in the boxes, minimum baking time, maximum core strength, easy shake-out and the greatest ultimate economy.

Among the many grades of Certified Core Oil is one which will deliver these advantages in full measure for any particular foundry conditions. Our laboratory is prepared to prescribe the ideal core oil for your class of work.

Tell us the grade and number of the core oil you use, your type and mesh of sand and your oven conditions. No obligation.

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Veterans of the Foundry

THE foundryman's job is about as tough as there is.

It is hard work and it is hot work. There is fluid metal to handle and casts to be made. Modern foundries, of course, are equipped with electricity and compressed air and have traveling cranes and trolleys to transport materials and do some of the heavier part of a molder's work.

It is still a real job and at one time during the war Dr. E. P. Edmunds, at that time the Regional War Manpower Commissioner, stirred up a discussion that rivaled the heat of a foundry by suggesting that beer be served to foundry workers to cool them off at certain periods of the day.

The foundrymen's breed is a hardy one, it may be gathered from these facts, but the molder can take it. He stays with his job.

For example, last night the Northeastern Ohio Chapter of the American Foundrymen's Association honored 130 men who had more than 40 years of service in the foundry industry, with a dinner at the Cleveland Club.

The real veteran was Ben Fuller with 65 years of service. He is with Whitehead Bros. Co. White-headed Gus Zimmerman has 64 years of service with the Eberhard Manufacturing Co. Ohio Foundry Co.'s J. V. Horning, with 63 years of service, ran Mr. Zimmerman a close race. Other top-ranking veterans included Charles Moravec, National Malleable & Steel Castings, 62 years; Charles Reyman, Atlantic Foundry Co., 61 years; Barney Birnbaum, American Crucible, 61 years, and Harry Lonergan, Allyn-Ryan Foundries Inc., 60 years.

It was a happy thought which prompted the honoring of these veterans of a rugged craft. They have certainly earned their recognition.—*Cleveland Press.*

(*Continued from page* 188)

mendatory talk by the chapter president.

After that the fun began, with a good floor show put on, including small talk from the m.c., acrobats, a quartette, xylophone numbers and other entertainment.

About 325 members and friends attended the meeting, which broke up after 10 p.m.—*John E. Hubel.*

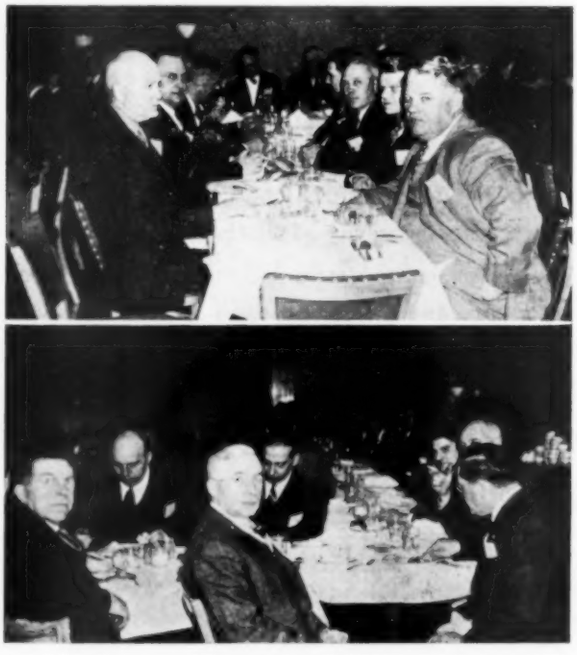
Western New York

CHAIRMAN Arthur H. Suckow presided at the May 3 meeting of the Western New York Chapter of the AFA, held at Hotel Touraine, Buffalo, with 62 members and guests in attendance. Adrian C. Den Breejen, of the sand research laboratory, the Hydro-Blast Corp., Chicago, was guest speaker and presented an interesting talk entitled "Practical Foundry Sand Problems."

"Know your sand and produce better castings" was the theme of Mr. Den Breejen's discussion. He emphasized the importance of securing the type of sand best suited for the castings to be produced and explained in detail the chemical and physical aspects of various sands. Other phases of sand control presented by the speaker included the application of synthetic or natural bonded sands, use depending upon equipment available, and progress made in recent years in sand reclamation.

A lively discussion period followed the talk, which indicated the interest of those present in this subject.

The nominating committee presented the following slate of officers and directors to serve, beginning July 1: Chairman, Henry C. Winte, Worthington Pump & Machinery Corp., Buffalo; vice chairman, Elliot R. Jones, Lumen Bearing Co., Buffalo; secretary, Leo A. Merryman, Tonawanda Iron Corp., North Tonawanda, N. Y.; and treasurer, Martin W. Pohlman, Pohlman Foundry Co. Inc., Buffalo. Nominations for directors, to serve for three years, included: John C. Nagy, Charles C. Kawin Co.; Leo C. Smith, Lakeside Bronze Inc.; and John R. Wark, Queen City Sand & Supply Co., all of Buffalo.—*Leo A. Merryman, secretary.*



NORTHWESTERN PA.: Some of the members and guests of Northwestern Pennsylvania Chapter of the AFA at the monthly dinner meeting in Erie, Pa.

Cincinnati

VICE Chairman Joseph Schumacher presided at the May 13 meeting of the Cincinnati District Chapter of the AFA, held at the Engineering Society headquarters with 85 members and guests in attendance. John N. Richardson, consulting engineer, Modern Equipment Co., Port Washington, Wis., was guest speaker and gave an interesting talk on the various methods of cupola charging and equipment, assisted by the sales manager of that company, Mr. Mueller, who added to the discussion.

A series of three films was shown covering cupola charging, pouring ladles, monorail and crane equipment in operation. Views taken in a number of large foundries illustrated the wide variety of setups that can be arranged.—*J. Schumcher, vice president.*

Birmingham

REGULAR monthly meeting of the Birmingham Chapter of the AFA held Apr. 26, at the Tutwiler Hotel, Birmingham, was attended by approximately 100 members and guests. Following the dinner and brief business session, the meeting was turned over to the program chairman, J. A. Bowers, who presented the guest speaker, Charles J. Scullin, foundry consultant, St. Louis.

Mr. Scullin gave an enlightening talk on "General Foundry Practice," in which he incorporated his experiences obtained in over 1500 different foundries. He stated that foundry problems could be solved within organizations if the proper control of variables and thorough checking of finished products were considered a must and not a guess. He encouraged all foundries to prepare for the time

when business would be sought rather than offered, which would make foundrymen more efficient and ready to obtain costs that would make the foundry industry profitable in normal times. In a brief discussion of cupola practice, Mr. Scullin said that most cupola troubles were found in the faulty operations rather than in the raw materials.

Joseph T. Gilbert, chairman of the nominating committee announced that the following nominations had been made for officers and directors of the chapter for 1946-47: Chairman, T. H. Benners Jr., Woodward Iron Co.; vice chairman, W. E. Jones; secretary-treasurer, Fred K. Brown, Adams, Rowe & Norman Inc. Directors nominated to serve for three years: J. A. Woody; for two years, Tom Bellsnyder, Dan B. Dimick and A. S. Holberg: for one year, James Bates.—*J. P. McClendon, publicity director.*

Southern California

DESPITE difficulties engendered by the Los Angeles Railway transit and bus strike for three weeks, Southern California Chapter of the AFA held its monthly meeting May 24 at Roger Young Auditorium, Los Angeles, with a large group of members and guests in attendance.

E. R. Mertz, associate professor of the University of Southern California, gave a most instructive talk, illustrated with a number of slides, on blueprint reading. "Prof. Dick," as he is known to those in the metal industry, proved how relatively simple it is to interpret drawings of castings provided the foundrymen understands basic principles of drafting. He pointed out that it is usual for the customer to furnish the foundry with a finished machine drawing, and the foundry or its pattern shop marks up the dimensions to include the required finish, from the buyer's finished drawing. Some foundries simply mark these dimensions on the print furnished, but foundries that have their own pattern shops make up a pattern drawing to include the finish which must be added to the buyer's drawing.

Following this talk, Ralph A. Lewis, sales manager, Los Angeles Steel Casting Co. Inc., discussed in detail short cuts in determining casting weights from prints. The speaker proved that with a bit of experience in quick estimation of casting weights, a man can tackle even the most complicated design with assurance. He stated that the use of one of the several existing types of weight-estimating cards or slide rules, is also most helpful in this work.

First annual "Ladies' Night" was held May 25 by the chapter at Lakewood Country Club, Long Beach, Calif. Seventy

(*Concluded on page* 194)

SAVINGS because you get all the
air you want—easily and economically
—with Schramm Air Compressors!

Schramm Air Compressors are compact, sturdy,
vibrationless . . . and offer such distinctive features
as 100% watercooled . . . mechanical intake valve . . .
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using Schramm have discovered. We invite
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From it you will see the wide range of sizes
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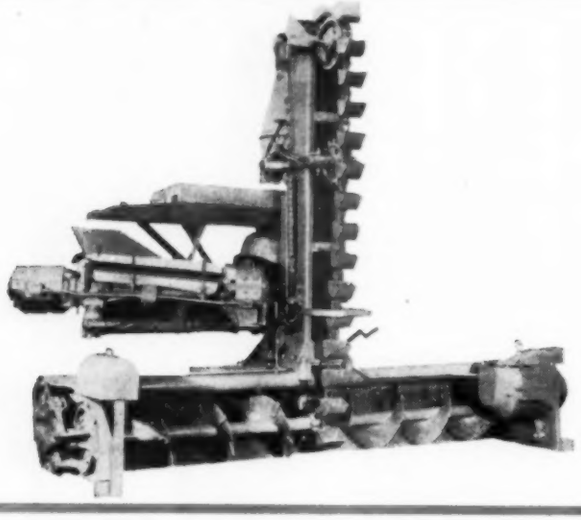
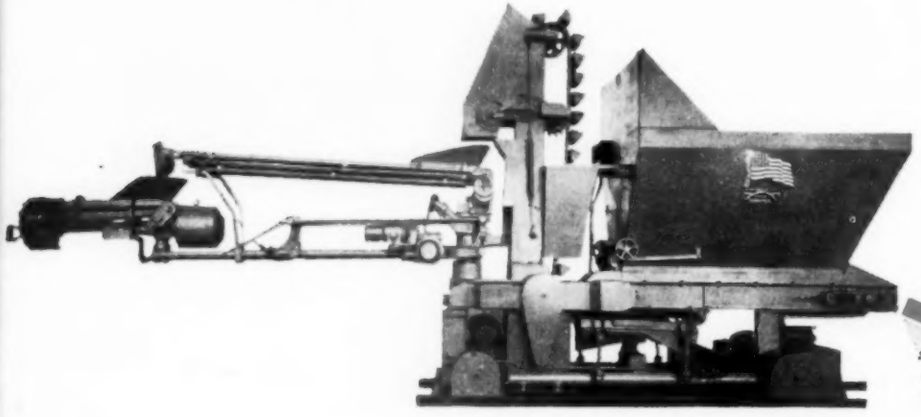
YOUR FOUNDRY . . .
Be it small, medium or large . . . can efficiently use the

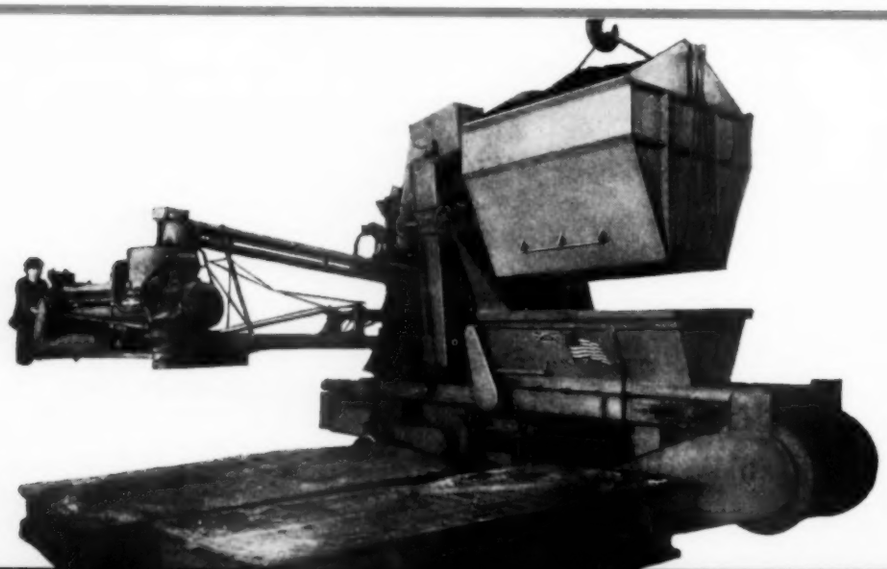
Stationary Sandslinger — for fast, accurate, uniform ramming of a variety of molds from repetitive patterns.



Tractor Type Sandslinger — a complete unit that conveys, prepares and rams its own sand and operates under its own power on floor rack tracks.



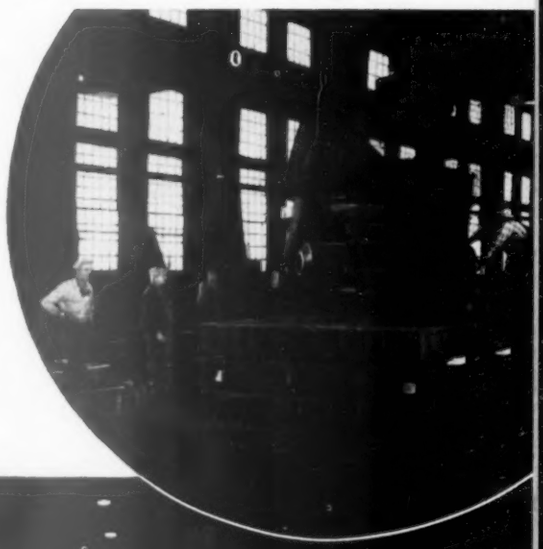
Motive Jr. Sandslinger — a specialty for jobbing foundries — quickly rams various sizes of molds as it travels up and down foundry bay on narrow gauge track carrying its own sand supply.



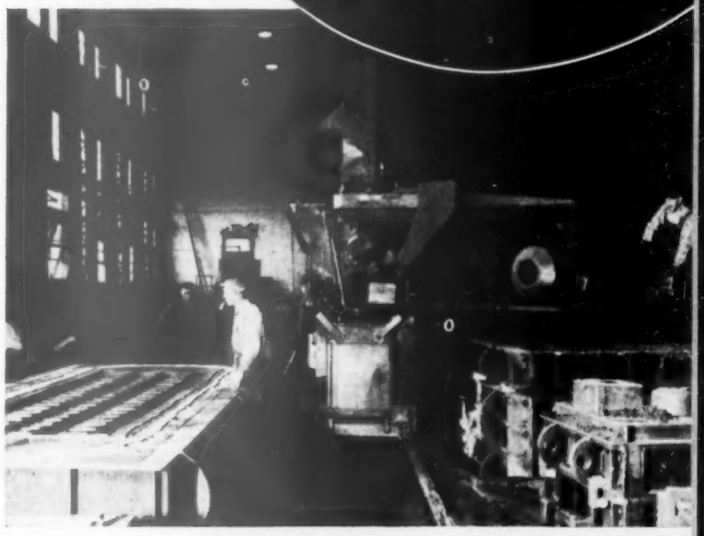
Speedslinger — fastest, most efficient ramming unit — operator rides the head, directing every function through centralized control.

Sandslinger!

HERE'S THE RESULTS OF A SANDSLINGER AT THE PRESCOTT COMPANY'S FOUNDRY



Views of Prescott's "Slinger." Two 10-ton detachable sand hoppers keep this machine in constant operation.



Ramming efficiency . . . the "Slinger" has it! At The Prescott Co., Menominee, Michigan, their Motive Jr. Sandslinger can ram a mold (*19'x11'—46"* drag, *12"* cope) in 10 hours using 3 men (including set-up, securing and ramming, and pattern drawing time). To ram this mold by hand would take 4 men (*2* molders and *2* helpers) at least 24 hours to perform the same operations.

There's a size and type of Sandslinger for every foundry . . . large or small. B & P Engineers will advise you as to the type best suited to your foundry's requirements. Speed-up production . . . lower costs! Write now!

Pit mold (7'x13'—12" cope, 7' drag) rammed by "Slinger" in 10 hours. Hand ramming would have taken 24 hours. In addition to their great speed, "Slingers" ram the sand hard and uniformly.

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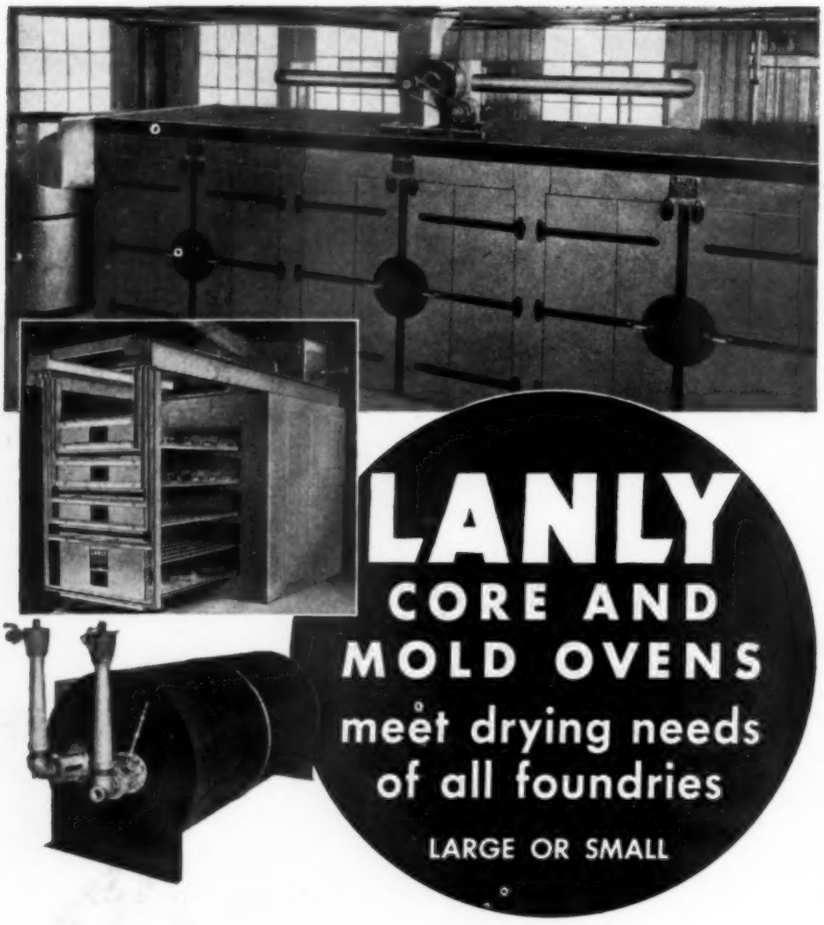
General Offices: 2424 North Cicero Avenue, Chicago 39, Illinois • Plant: 2541 North Keeler Avenue, Chicago 39, Illinois

The Beardsley & Piper Company are manufacturers of Sandslingers • Speedslingers • Speedmullors • Screenarators • Mulbaros • Shake-outs • Sand Conditioning Machines • Gyratory Screens



LANLY builds core and mold ovens in a full range of types and sizes. Each unit is designed to meet specific requirements efficiently and economically.

Features contributing to the consistent record of success are the Lanly self-contained convection type heater, which circulates and recirculates heated air, and the Lanly method of balanced heat circulation.

Lanly Rack Type Ovens, one of which is illustrated above, are popular for baking medium sized and small cores. Note that one heater serves all three units.

Lanly Car Type Ovens are widely used for drying large molds and baking large cores. Close fitting, well insulated, easily operated doors are a feature.

Lanly Drawer Type Ovens of new, advanced design assure large output, economically and with less breakage of cores than formerly experienced.

Independently operated drawers, ball bearing trolleys and the absence of cam levers, give the unusual results.

Write for catalog today

THE LANLY CO.
OVENS FOR INDUSTRY
HEATED BY GAS, OIL, ELECTRICITY OR STEAM
750 PROSPECT AVENUE · CLEVELAND, OHIO

(*Concluded from page* 191)

couples attended the dinner dance and card-playing fiesta, and all testified that it was the outstanding event of the season. Earl Shomaker, Kay-Brunner Steel Products Inc., Alhambra, Calif., entertainment chairman, and his committee did themselves proud.—*J. B. Morey, publicity chairman.*

Cleveland

LAST meeting until fall of the Pattern Manufacturers' Group of the Associated Industries of Cleveland was held at Hotel Cleveland, June 5, with an attendance of 35. Peter Rettig, chairman of the group, presided. D. C. Courtright, principal, Cleveland Trade School, spoke briefly on the recent favorable vote on the Cleveland municipal bond issue, which includes $2,250,000 earmarked for a new trade school. This school will include a modern pattern shop and foundry. Mr. Courtright praised the efforts of the local patternmaking and foundry groups in urging voters to approve the bond issue.

Three winners of the apprentice contest conducted by the Pattern Manufacturers' Group were guests at the meeting and were awarded cash prizes. They were Frank Gangale, Great Lakes Pattern Works; Michael Simenic, Aluminum Co. of America, who also took third prize in the patternmaking division of the AFA national apprentice contest, and Phil Sheaffer, Cleveland Diesel Division.

Principal speaker of the evening was Earl Dean, Cleveland representative of the Zurich group of insurance companies, who spoke on the importance to industry of maintaining employees' health as well as safety. Without attempting to minimize emphasis on safety measures within the plant, he pointed out that lost time through illness costs industry far more than do lost-time accidents. Several of a group of slide films prepared for showing before plant workers, in which the health angle is stressed, were presented.

The program was concluded with George Gedeon, program chairman, presiding and throwing the meeting open for discussion relative to suggestions concerning the programs for next season's meetings.—*William G. Gude.*

Champion Acquires Branch Plant

Champion Foundry & Machine Co., 1314 West Twenty-First St., Chicago, has bought a one-story factory building containing 40,000 sq ft of floor space at North Rockford, Ill. This plant will be equipped and operated as a branch to take care of increasing demand for the company's coreblowers and molding machines.

OBITUARY

MICHAEL J. SWEENEY, 73, treasurer and chairman of the board of directors, Allyne-Ryan Foundry Co., Cleveland, died June 3, at his home in Shaker Heights, O. A native of Mineral Ridge, O., Mr. Sweeney went to Cleveland as a boy and received his early education there, later studying metallurgy at Case School of Applied Science. He was assistant city chemist for a short time, then was associated with Interstate Foundry Co. until 1913, when he became one of the founders of the Allyne-Ryan company. He resigned as president of the company in 1945, and became treasurer and chairman of the board, positions which he held at the time of his death.

♦ ♦ ♦

Eric E. Sommer, 34, sales engineer, New Products Division, Linde Air Products Co., New York, died June 5, in the La Salle Hotel fire, Chicago. A native of Hove, England. Mr. Sommer received his early education in Buffalo and was graduated from University of Michigan in 1935. He was appointed associate engineer at the Tonawanda, N. Y., plant of Linde Air Products, at that time, later becoming assistant to the research manager and then was transferred to the New York office. He had been sales engineer for the New Products Division since April, 1945.

♦ ♦ ♦

Ed H. Noack, 71, head of the Monarch Foundry & Engineering Corp., Stockton, Calif., until about ten months ago when he was incapacitated by a heart ailment, died May 12. Mr. Noack was one of the founders of the company, in 1907. Prior to that he was associated with the Samson Iron Works and the East Street Foundry.

♦ ♦ ♦

Robert F. Devine, 58, president and treasurer, Erie Forge Co., and Erie Forge & Steel Co., Erie, Pa., died May 21 at his home in that city. Mr. Devine had been head of the companies since his father's death in 1928. A native of Kansas City, Mo., he went to Erie in 1903.

♦ ♦ ♦

Arthur E. Frankel, 28, chemical engineer, died recently in a Chicago hospital. During the war Mr. Frankel was in charge of the laboratory of the National Bronze & Aluminum Foundry Co., Cleveland.

♦ ♦ ♦

J. Earl Taylor, 66, owner of the Taylor Foundry & Engineering Co., Grass Valley, Calif., died May 20 in that city.

Easier TO OPERATE
Better PERFORMANCE!

The Screenarator is the lowest cost portable sand conditioner! Ideal for small, medium and large foundries, it is fast, versatile and produces a flowable, easily rammed sand. (The *improved* Model "M" Screenarator has a redesigned motor and main frame...also a new retractable handle that facilitates ease of movement and operation).

The operator easily moves Screenarator to desired position from floor to floor. Electrically operated, it plugs into an available power outlet.

THE Improved SCREENARATOR

THE BEARDSLEY & PIPER COMPANY B&P "BETTER METHODS"

The Screenarator's height and angle of screen makes shoveling easy. The Screenarator controls the discharging of the conditioned sand...placing it to any desired distance within 25 ft.

The Screenarator thoroughly screens the sand... frees it from burned cores, gaggers and other foreign matter. It cuts and breaks lumps, aerates the sand, and then aerates it for the second time when it piles the conditioned sand wherever desired.

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MAN-TO-MAN on the Molder's Bench

"At the Convention"

By RALPH L. LEE

CONVENTIONS come and conventions go, at least they do for me; in fact, it seems that all my life I have been either going to one or returning from one, only to get ready to go to another. So the thought of attending a convention does not ordinarily keep me rolling and tossing at night. But in spite of all of this, I must say that I found our 50th Anniversary American Foundrymen's Association Convention to be one of the most interesting, if not the most interesting, I have ever had anything to do with.

At most conventions, many of the people I meet and chat with act as though they would rather be some place else or, for the sake of duty, they would see the thing through. Others come right out and say if it weren't for the bull sessions at night, they wouldn't have come at all.

And speaking of the extracurricular hotel room sessions, I heard directly from one of the hotel brass hats that they had never had a bunch of he-men the size of ours who could handle the old stuff better. I agreed with him, for I went from room to room on a little research project myself. The only reason I mention the bull sessions at all is that while I heard a few new stories and not too many old ones, most of the conversation was definitely on the subject of newer and better ways of solving new and old foundry problems. There was another difference between these bull sessions and those I had attended at other conventions—the old timers were not continually viewing with alarm, they weren't talking about the grand old days and the carryings on of the young whipper-snappers who didn't know a cope from a drag.

I noticed too that the young whipper-snappers joined in the conversation with their elders with no seeming consciousness of the wide spread in ages. Evidently the demanding nature of things we've got to contend with in the foundry took the center of the stage and pushed relative seniority into the background.

Another thing I got a bang out of—I didn't run into anyone who, regardless of his age or experience, was taking his troubles lying down. Everyone was up on his feet punching and wide awake for any suggestions, regardless of their source. In fact, some of the oldsters and youngsters even went so far as to listen to me when I struck my neck out.

The convention delegates reminded me a whole lot of a gathering of airplane pilots, all of whom knew that at one time or another they had made some pretty lousy landings and that they could make another if they didn't keep their fingers crossed. I guess there is something about both molding and flying that keeps a fellow sort of humble.

* * *

While I would have liked to have heard more of the papers read, I had only two days to spend and I knew I would have a chance later to read them in the *Transactions*. So I decided I had better do the exhibits, which I surely did. I don't believe one escaped me. In fact, the way my feet felt at the end of the first day, they must have been worn clean up to the ankles—and somewhere near the knee joints at the end of the second day.

I suppose some chronic convention attenders might not have been dazzled by the art display in the exhibits, and I think anyone will have to admit that it would have been quite some chore to work glamour into, let us say, an exhibit of a core oven or a muller. On the other hand, I don't care how many conventions a person might have attended in the past, I think he will have to admit that he never received more patient personal attention from booth attendants than he did from the boys at the convention.

I couldn't help but think that any young man toying with the idea of going into the foundry business couldn't have accumulated a better library on the subject and more practical advice than by taking the literature passed out and the explanations given. I hope I'm not accused of painting the lily, but I came away from the exhibit with my suit case stuffed with darn good data and my head full of darn good ideas.

* * *

I could go on and on talking about what I saw, learned and felt as a result of the convention, but looking back now from the standpoint of my daily grind, the thing that impressed me most was the solid, sane and practical steps by which the foundry industry is progressing. Usually at a convention you see quite a few Goldberg proposals and highly theoretical flights into the realms of the imagination. Without exception, the new equipment I saw and the new methods I heard discussed were based upon practical answers to current problems and production needs.

While I have always suspected it to be true, I got the feeling stronger than I have ever had it before that foundry people as a class are primarily doers to whom actions speak louder than words. Turning this feeling around another way, it meant to me that in the foundry industry it doesn't make any difference who your father was, how far you went in school or how glib your tongue, your standing among your associates will depend solely upon your ability to produce, to lick the problems you have to face and to get your job done on time.

While this is no doubt true in most lines of work, it seems to me that bossiness of molten metal and the stubbornness of sand make it particularly true in the foundry industry. This being the case, I am more convinced than ever that young men can take up foundry work as a career with no fear of politics or pull interfering with their personal progress.

CUPOLA MELTING OF CAST IRON

(*Continued from page* 93)

tuyere area and probably have experimented with tuyeres of their own design, yet the more important tuyere considerations are concerned with the elevation of the tuyeres above the sand bottom and whether the refractories at the tuyere cover plate provides for a small restriction in cupola diameter, normally referred to as a bosh. This same operator is not overly concerned if there is no pressure gauge, or if the charging gang guesses at the amount of coke, or if the tap-out man taps metal when *he* deems it wise to do so. A multitude of minor details, similar to these, determine whether the melting department performance is good or poor.

Cupolas lined to 36, 42 and 48 in. diameter have areas of 7.07, 9.60 and 12.57 sq ft, respectively. It will be noted that even in these narrow ranges of cupola sizes, the area of a 48-in. cupola is almost two times that of a 36-in. cupola. If we said the weight of the intermediate coke charge should be 10 lb per square foot of cupola area, the respective weights for these three sizes of cupolas would be 71, 96 and 126 lb. Although these fuel units are probably smaller than most foundries normally use, they are the maximum units permissible in good operations. I prefer to determine the weight of the intermediate coke charge at 7.5 lb of coke per square foot of cupola area, for which respective fuel charges would be 53, 72 and 95 lb.

Small Foundry Has Advantage

There is no minimum limit to this fuel unit except limits established by the law of diminishing returns; I have used units, in commercial operations, as low as 5 lb. A small foundry has an advantage over the large foundry in selecting an optimum fuel unit for the intermediate coke charge as the large foundry is frequently saddled with mechanical equipment which may not be readily utilized for the best operating conditions.

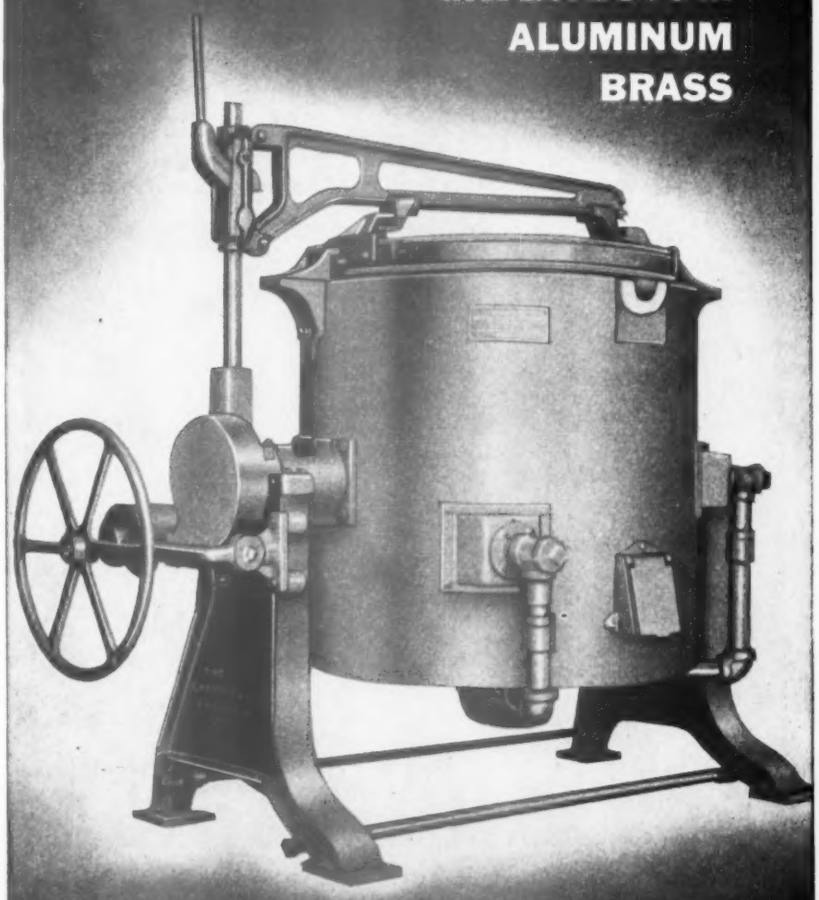
In expressing a preference for using 53, 72 and 95 lb intermediate coke charges on 36, 42 and 48 in. diameter cupolas, I did not round out these weight units to round figures, such as 50, 75 or 100 lb, because it is futile to fork coke into the cupola and expect to achieve accuracy in handling fuel. Furthermore, we can get a better appreciation of the importance of small details if we think in terms of absolute calculations rather than in rounded figures of hundreds or thousands of pounds.

Size of the individual coke particle making up these 53, 72 or 95 lb inter-

HAUSFELD

A FURNACE FOR EVERY NON-FERROUS MELTING REQUIREMENT

MAGNESIUM
ALUMINUM
BRASS



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The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

mediate coke charge units is also important. There is an exceedingly strong preference for *large* coke in our industry; however, I am a strong advocate of *sized* coke—coke that is proportioned to the size of the cupola. This does not mean that a foundry with several sizes of cupolas has to inventory or use several sizes of coke. The governing size may be established by the smallest cupola and used to good advantage on larger cupolas. Nor does it mean that a coke supplier has to produce a wide variety of sizes to satisfy all of his consumers. Most producers of foundry coke have facilities which permit them to offer a choice of sizes, sometimes as many as five.

In some cases these sizes are designated by a numbering system, such as 1, 2, 3, 4, or 5, and sometimes by a designation such as 4 x 3. This latter means the coke passes through a 4 x 4-in. mesh screen and is retained on a 3 x 3 in. screen. Although suitable particle sizes for coke for use on 36, 42 or 48 in. cupolas might be 3½ x 2½, 4 x 3 or 4½ x 3½, any one foundry using these three cupolas might cover all requirements by selecting the size best suited to the 36-in. cupola. The best procedure is to consult with the supplier concerning his facilities for sizing coke, and compromise on the best size he can produce with his facilities.

Very large cupolas can be operated successfully with small coke, but small cupolas cannot be operated successfuly with very large coke. As a suggestion, go out to your cupola coke supply and select three coke particles, one representing the larger pieces, one the intermediate, and one the smaller pieces, and weigh each piece accurately. Coke particles for 36, 42 and 48 in. cupolas might weigh 0.6, 1.0 and 1.5 pounds, respectively; or if you have all three sizes of cupolas in your foundry, let the smaller coke particle determine what size you buy.

Emphasis should be put on the weight and particle size of intermediate coke charges because these factors determine temperatures in the cupola, and because coke plays a part in the chemistry and metallurgy of cast iron. Whether the cupola spout metal temperature is 2650 or 2850 F, or the cupola product contains 2.0 or 4.0 per cent C are functions associated with amount and size of fuel.

We still have to consider the coke bed. It was stated earlier that a significant consideration might be concerned with the elevation of the tuyeres above the sand bottom or with the use of a pressure gauge. If we know the operating pressure of the cupola in ounces we could say that a proper height for the coke bed in terms of inches above the cover plate of the main row of tuyeres, measured after the full depth of coke has burned through to a white heat, is 10.5 times the square root of the pressure plus 6. If the wind box pressure is 4, 9, 16 or 25 oz the respective bed height should be 27, 37.5, 48 or 58.5 in. In determining the proper height for a coke bed we are not concerned with cupola size, although there is some misconception in industry that a high coke bed is associated with a large size cupola and vice versa.

Regulate Height of Tuyeres

Some reference to the elevation of tuyeres over the sand bottom is pertinent here. Where the cupola is being prepared for the day's melt, coke may be ignited by wood or an oil torch, but after it is ignited, combustion air enters at the tuyere level, and with natural draft the high temperature zone is above the tuyere level. We would like to have the highest temperature zone close to the sand bottom so that refractories in the cupola bottom and side walls below the tuyeres can absorb their heat capacity and be preheated to a temperature perferably as high as that of the metal, reaching this zone after the melting operation is initiated.

The temperature of metal tapped from a cupola during the first part of the heat is proportional to the temperature of the cupola well zone. Although it is important to get hot metal from every cupola right with the first tap, it is more important to the small foundry than to the large foundry. Whether the metal is hot or cold on first tap and for several subsequent taps is a function of the elevation of the tuyeres above the sand bottom. As cupola refractories are 4 in. high this elevation might be as low as 8 in. or more than 24 in. The man who understands cupola operation best would keep this elevation as low as is practical.

Cupola metal charges are frequently determined by arbitrarily selecting a 1000, 2000 or 3000-lb unit, and intermediate coke charges are determined by dividing the iron charge unit by some figure more or less than 8. Dividing

Progressive Match Plate Molding

THE accompanying illustration shows an interested audience watching a demonstration of the new match plate molding unit designed by the Fellows Corp., Milwaukee, and displayed at the recent AFA Foundry Show in Cleveland. Said to be capable of producing up to 360 snap molds per hour, the unit employs progressive operations in attaining high-speed output. Each machine of the unit is designed to perform one simple operation in the same period of time. This period averages 0.17-minute. Since each machine performs a simple operation, its design is simple and its operation requires little skill or effort. Patterns can be run over the unit as many times or as few times as the daily production schedules require, or the line can be filled with duplicate plates of the same pattern. Rate of production is independent of length of run or size of molds.

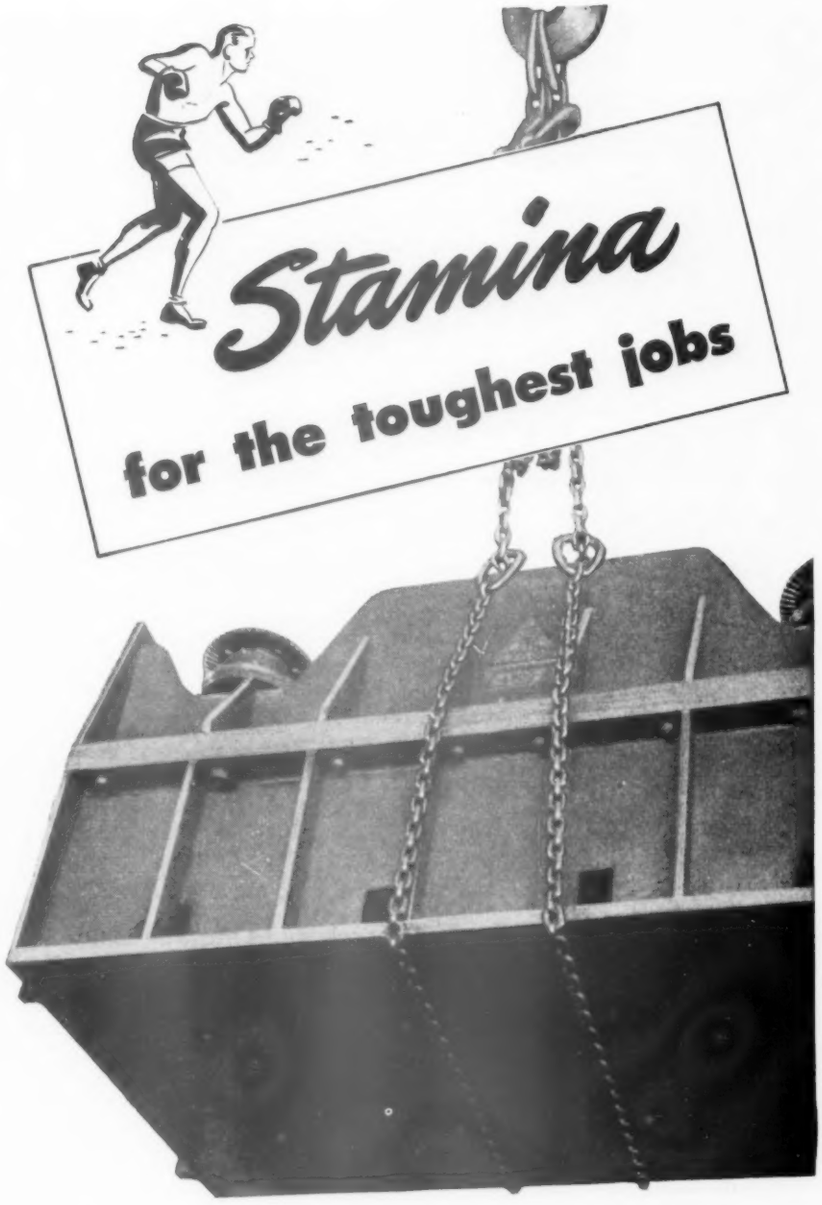
the 1000, 2000 or 3000 lb metal units by 8 means intermediate coke charges of 125, 250 or 375 lb, respectively. It was recommended earlier that intermediate coke charges be determined by cupola area, and using 7.5 lb of coke per square foot of cupola area, the intermediate coke charges for 36, 42 and 48 in. cupolas would be 53, 72 and 95 lb, respectively. We could arbitrarily determine the weight of the iron charge by multiplying these fuel units by some number between 8 and 12. Using a 95-lb intermediate coke charge in a 48-in. cupola, the metal charge might range between 760 and 1140 lb. Factors which determine whether this iron charge should be 760 lb or 1140 lb are concerned with the amount of steel scrap in the cupola charge, or better said, with the carbon content of the cupola charge, with the degree of skill exhibited in all phases of the melting department, and in relation to the courage and aggressiveness of those responsible for melting performance.

Metal In Cupola Absorbs Carbon

As the desired carbon in the cupola product decreases from 3.5 to 3.25 to 3 to 2.75 down to 2 per cent, each 1000 lb of metal in the cupola will absorb approximately 3, 6, 9, 12, 15 to 18 lb of coke respectively, when precision operations prevail, or more without precision control. If we produce a 3.5 per cent product from a charge containing 3.5 per cent C with a fixed intermediate coke charge of 95 lb and a metal-fuel ratio of 10 to 1, the iron charge would weigh 950 lb. If we wish to produce a 2.5 per cent C product, the ingoing cupola charge would have to be much lower in carbon, say about 1.35 per cent C, and 1.15 per cent C would be absorbed from the intermediate coke charge. Here the 95-lb coke charge serves two functions; a portion is used for combustion and a portion plays a part in the chemistry of the cupola product. Of this 95-lb coke charge approximately 13.5 lb would participate in the chemistry of the cupola product, leaving 81.5 lb for combustion, and with a 10 to 1 ratio the metal charge might be 815 lb.

When all factors dealing with cupola melting are under precision control only 70 lb of coke are needed to melt and superheat 1000 lb of metal to 2850 F, but this quantity of coke does not include that amount of coke which participates in the chemistry of the cupola product.

From the viewpoint of fuel economy in cupola melting, I am not concerned whether it requires 70 or 170 lb of coke per 1000 lb of metal for intermediate coke charges, but with fuel participating in the chemistry of the product, the value of the product may be greatly en-



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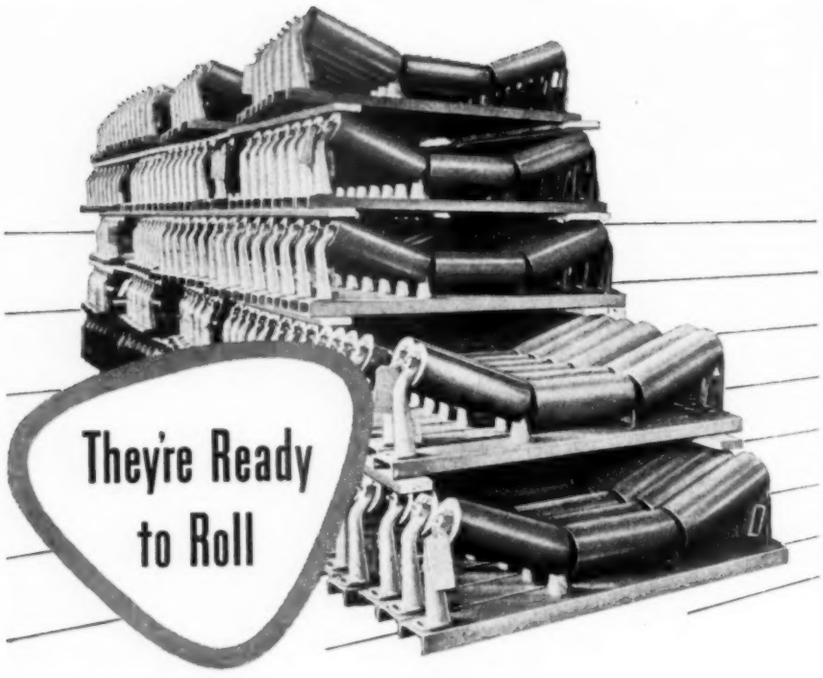
S. G. TAYLOR CHAIN COMPANY,
Dept. S 7, Box 509, Hammond, Indiana

TAYLOR MADE Chain "THE BEST BY TEST SINCE 1873."



They're Robins Troughing Idlers—"Job-Engineered" to keep rolling . . . and to keep operating costs down.

Idlers are really the heart of a conveyor system . . . they have to be built to "take it." And when they're built *right*, they can help reduce breakdowns that slow production.

Today, more than ever, foundry schedules must be maintained to supply the needs of industry. Thus it is especially important that the idlers on foundry conveyors are built *exactly right*, so that they provide long service without unnecessary maintenance.

Belt life can be longer, too . . . when idlers are "Job-Engineered" to keep belt and load running true.

That's why so many shrewd buyers specify Robins idlers for replacement on vital conveyors.

There is a Robins idler designed to roll on your conveyor . . . longer and better. So before you order idlers, why not write or call Robins?

A fully qualified "Job-Engineer" will give you a quick, accurate answer to your problem. There is no cost or obligation, of course.

Hewitt and Robins unite to offer you 136 years of combined experience in "Job-Engineered" rubber products and machinery designed to answer any materials handling problem you may have.

ROBINS
CONVEYORS INCORPORATED
PASSAIC, NEW JERSEY
DIVISION OF HEWITT-ROBINS INCORPORATED

AMERICA'S ONLY COMPLETE MATERIALS HANDLING SERVICE

hanced or adversely affected by the way fuel is handled. If coke costs 0.7 cents per lb, 70 lb or 170 lb would cost 49 cents or $1.19, a difference of 70 cents. The value of the product would be affected by as much as 10 or 20 times the amount involved in fuel considerations.

Carbon, the important element in cast iron, determines to a large extent what ingredients go into a metal charge and, consequently, the cost of the charge. In large measure, it also determines the quality of "material" produced in the cupola; and it has a major bearing on machinability and tool costs, particularly when hard spots are encountered in the machine shop.

We have emphasized the importance of sized coke, but it is equally important that the size of materials in the metal charge and in the limestone charge be suitable.

There are five zones in the cupola, Zone 1 extends from the charging door down to the melting zone and is a preheating zone. To the chemical engineer this preheating zone would be known as a counter-current heat transfer zone, with hot gases moving up and cold stock moving down. Zone 2 is the melting zone or where materials change phase from a solid to a liquid. When metal reaches its melting point in the melting zone, small globules form on the surfaces, then drop down to a lower zone. If some lower zone were not hotter than the melting zone, the metal would freeze or revert back to a solid instead of being superheated some hundreds of degrees above the melting point.

Control Temperature and Depth

Zone 3 is a superheating zone, and this is the more important zone. Two important conditions in this zone are its temperature and its depth. We control these when we determine why and how a charge is made up and placed in the cupola, and how the cupola is to be operated. As the intermediate coke charge increases from 5 to 25 lb of coke per square foot of cupola area, the amount of heat generated by a pound of fuel decreases and the temperature in the superheating zone decreases. As the size of fuel increases, the surface area available for reaction with oxygen decreases and the void area in this zone increases, so that excess air is required which reflects in a lowering of temperature in this zone and higher than necessary losses of such oxidizable elements as manganese and silicon.

The other factor concerned with this zone is its depth. Depth of the superheating zone is proportional to the melting rate. Cupolas lined to 36, 42 or 48 in. have nominal melting rates of 5.3, 7.2 and 9.4 tons per hour, respectively.

Industry uses these cupolas for as little as one-half these nominal melting rates to as much as 1½ times these nominal melting rates. That is, the nominal rate of a 48-in. cupola is 9.4 tons per hour but one foundry may be using it for as little as 4.7 ton while another is using it for as much as 14.1 tons. Depth of the superheating zone is least with the 4.7 ton rate and greatest with the 14.1 ton rate. All that is necessary to prove this point is to observe the metal temperature at one operating speed and then cut this speed in half and observe the loss of metal temperature. As a matter of fact, most operators have observed this fact many times and frequenty refer to it as loss of the coke bed.

Zone 4 is the tuyere zone. This is a drastic cooling zone because about 1 lb of cold air enters this zone for each pound of metal passing through it. Actually, 0.8 to 1.2 lb of air enters this zone for each pound of metal passing through. Good cupola operations achieve the better ratios of 0.8 to 1, while poor cupola operations are closer to 1.2 to 1.

Zone 5 is the cupola well zone. This is a chemical change zone where incandescent coke is submerged in molten iron and where appreciable quantities of carbon may be added to the metal. It is also a stagnant cooling zone. One may think of this zone as a mixing zone where the ingredients of two or three charges are accumulated to unify the chemistry of the cupola product, but it is not the place to attain this objective and should only be utilized as a mild balance wheel in the melting operation.

We should now give attention to positioning materials in the cupola at the charging door level and to removing metal from the cupola. Here the small foundry has an advantage over the large foundry, as it usually means a careful analysis of how things are done and making corrections to do them better. There are two major objectives—one, to see that fuel and components of the metal charge are level and uniformly distributed over each square foot of the cupola; two, to see that unlike components of the metal charge go into the cupola in a proper sequence. The order should be: High melting point materials (steel scrap) first, intermediate melting point materials (foundry returns) next, and the lowest melting point material (pig iron) last.

If materials are being slid off a wheelbarrow, industrial car or some other device through the charging door into the cupola, it is quite probable that an adequate job of charging is not being achieved. Study your method of charging materials in the cupola and establish a high standard of distribution.

The small foundry uses an intermit-

3300 C.F.M.—125-LB. PRESSURE

Fuller Rotary Compressors are manufactured in single and two-stage types, for capacities to 3300 c.f.m. actual free-air delivery, 125-lb. pressure.

Illustrated in the installation above are three Fuller Rotary Two-stage Duplex Compressor units. Each unit has a capacity of 3300 c.f.m. actual free-air delivery, 125-lb. pressure. Purchasing its first Fuller in 1938, this company and its affiliated companies have since purchased and installed a total of 70 Fuller Rotaries. Machines range in size from the smaller single-stage type 40-lb. pressure to the large two-stage type shown above.

Fullers have many outstanding features which recommend them for your consideration. One very important feature—due to their unique design—original capacities are maintained for the life of the machine. Bulletin C-5 gives detailed information. We'll be glad to send you a copy.

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C-134

FULLER
PIONEERS OF HIGH-EFFICIENCY ROTARY COMPRESSORS

tent tapping and botting procedure to remove metal from the cupola well. After the wind goes on, metal should begin to accumulate at the tap hole in 8½ minutes. The first tap should be taken a few minutes later and all subsequent taps should be taken at uniform intervals throughout the melt. The interval from one tap to another, which is the total time the tap hole is botted up, plus the time metal flows through the tap hole, should not exceed 4 minutes. The tapping frequency should be uniform intervals of 4, 3½, 3, 2½, 2 or 1½ minutes. The more frequent tapping intervals are for low total carbon cast irons and the less frequent intervals for higher carbon irons. Diameter of the tap hole should permit transfer of metal from the cupola well zone to the ladle in the least practical time. That is, it is desirable to make this transfer in 15 to 30 second rather than 60 to 120 or more seconds.

The cupola spout should only be wide enough to accommodate the mass of metal flowing per unit of time; it need not be wider than 4 in. and in most cases it could be 2 in. It would be well to cover as much of this spout as possible with refractory brick.

Generally, the gray iron foundry is quite lax in the depth of refractories used in ladle linings, in preheating ladles, in the numbers of transfers of metal from one ladle to another, in dispatching the proper amount of metal to a pouring floor, in seeing that this metal is disposed of promptly and in refilling ladles that have not been completely emptied on prior use.

Metal temperature losses between cupola spout and the pouring of a mold are frequently 200 F or more, and sometimes as high as 500 F. If we struggle to achieve a cupola spout temperature of 2850 F, we have gained nothing if we pour at 2350 F, or at 2150 F. There is an optimum pouring temperature for cast iron, and the mechanical properties of this engineering material are best achieved when proper pouring temperatures prevail.

One procedure which cannot be considered as sound is, the production of one base iron in the cupola, with subsequent ladle doctoring to produce different grades of cast iron. I recognize the wide diversity of operating conditions from one foundry to another, as is illustrated by a small foundry operation versus the high production foundry of the automotive industry. I am convinced that future progress in this industry will be proportional to the effort extended to achieve the best ratio between quality of product and costs incurred in achieving quality. Weaknesses of a single base iron operation are: First, the range of grades of cast iron that may be produced is narrow; second, the selection and cost of raw materials making up a cupola charge is optimum for only one grade of cast iron; third, the procedure of ladle doctoring is wasteful in that the salable product is only two-thirds of the metal treated; fourth, the weight of metal tapped into a ladle is usually based on estimates which may be considerably in error; and fifth, subsequent production of equivalent quality products is made easier by using returns from prior production.

Inoculation Principle Is Not New

Various materials may be added to metal in the ladle as it is being tapped from the cupola. Some of these materials, called inoculants, are known as ferrosilicon, calcium silicide, graphite, silicon carbide and a whole host of silicon alloys containing one or more of the following elements: Calcium, manganese, chromium, zirconium, aluminum, nickel, iron or carbon.

The principle of inoculation is not new, a procedure having been in use for more than 25 years. The objective of inoculation is to produce a better product than would be the case if the procedure were omitted in the production process. In order to appraise the need for inoculation we need to examine into the three phases that foundry products pass through. The first phase is the foundry level where the component part is produced, the second phase is the machine shop or other processing operation where further work is done on the product, and the third phase is the service performance rendered by this foundry product.

If we produce sash weights, elevator counterweights or ship ballast, requiring no processing operations beyond the

Trucks Facilitate Handling Operations

A CUSTOM-ENGINEERED production plan, perfected under the intense pressure of wartime necessity, is demonstrating its entire suitability for peacetime production, say officials of Union Steam Pump Co., Battle Creek, Mich. Vital element of the plan, capitalizing lessons learned through war production, is a fully mechanized system of handling material throughout the entire production cycle, from raw material to finished products.

In the foundry a three-wheel towing tractor with dump body carries molding sand from stock piles to mixers, hauls coke and wood for the cupola and does other miscellaneous heavy handling jobs. A carloader fork truck with a bucket attachment handles bulky castings, helps to load the tractor and handles shakeout sand and refuse.

During the night shift the fork truck carries hot castings up to 2000 lb per load in the bucket attachment from molding floors to cleaning room and tumbling mills. Castings are brought direct from the cleaning room to the machine shop by fork trucks with 42-in. forks. As shown in the accompanying view, these fork trucks handle the castings between departments for progressive machining and assembly operations, and then transport assembled pumps or subassemblies to finished stock. No pallets, skids or tote boxes are needed since the castings lend themselves perfectly to direct handling. Smaller 1000-lb fork trucks speed lighter materials to and from storage. Finished pumps, because of their top-heavy characteristics, are loaded onto trailers and towed to the shipping dock by a small towing tractor for loading by overhead crane.

Fork trucks and towing tractors used by Union Steam Pump are by Clark Tructractor, Battle Creek.

foundry level, where service performance could easily extend to hundreds of years, there would be little reason to consider inoculation. But if we select a component part in an engineering application—for example, a diesel engine liner—it would pass through considerable processing beyond the foundry level and might render a satisfactory or unsatisfactory service performance. In this case, effective inoculation would greatly reduce machining costs, minimize or eliminate need for annealing and produce a product of better mechanical and wear properties.

I use the term "effective inoculation" for it is possible to go through the mechanics of adding an inoculant without achieving inoculation. Molten cast iron has a density of the order of 7.0 to 7.2 grams per cubic centimeter. If we drop an ice cube into a ladle of water, the ice cube will penetrate the surface level of the water. If we drop very tiny ice particles and very large ice particles into water, penetration will be in proportion to particle mass at a given velocity. When inoculants are of very low specific gravity, and when particles are finely divided, additions to cast iron are not predictable. The gravity of 50 per cent Fe-Si is more favorable than 75 per cent Fe-Si, and 75 per cent Fe-Si is more favorable than 85 per cent. One-half inch mesh ferrosilicon, exclusive of fines, is more favorable than 12 mesh and down (including fines).

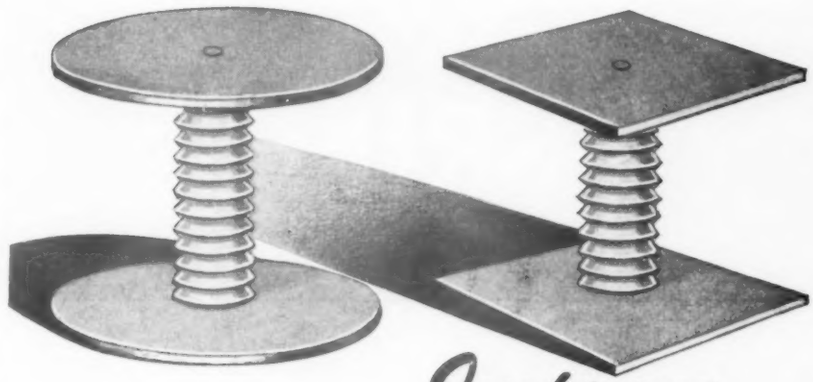
The cost of inoculating a ton of hot metal, using various quantities of the many types of inoculating materials on the market, ranges from 50 cents to more than $7. On the basis of 70 per cent yield, this would mean 70 cents to $10 per ton of castings.

When the percentage of total carbon, plus one-third the percentage of silicon present in the final product, totals 4.3 or less, the iron is hypoeutectic and the inoculating procedure is warranted. For example, a 3.25 per cent TC and 1.5 per cent Si iron gives a numerical figure of 3.75, it is hypoeutectic and is suitable for inoculation, but a 3.5 per cent TC and 2.7 per cent Si iron gives a numerical figure of 4.4; it is hypereutectic and not suitable for inoculation.

I have found that coarse mesh, high gravity ferrosilicon is an effective and low cost inoculant.

Publishes Bulletin

Brazilian Association of Metals, Praca Cel Fernando Prestes 110, Sao Paulo, Brazil, has published its first bulletin. The bulletin comprises 116 pages containing nine papers presented at the first general convention of the association.



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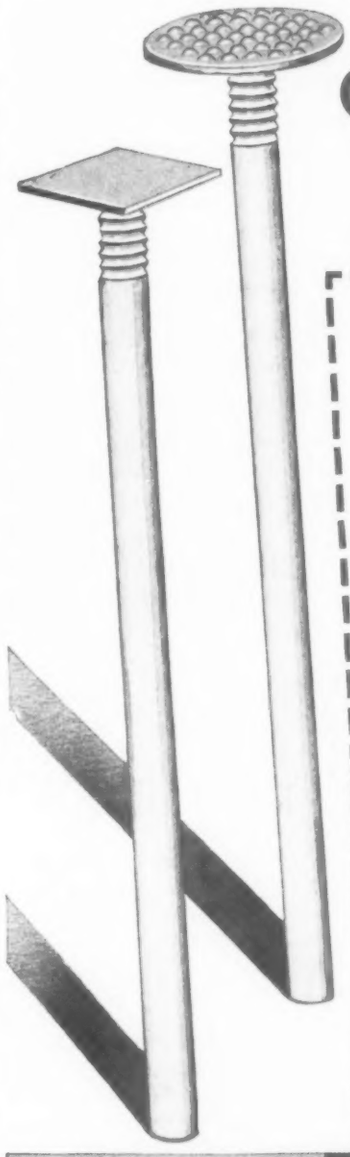

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Industry BRIEFS

CAST METALS CORP., Deshler, O., a new jobbing foundry, has been organized for the manufacture of gray iron castings. Foundry buildings and facilities have been leased from the Deshler Foundry & Machine Works, which will do machining on castings manufactured, if specified. New squeezers, rollovers and strippers have been installed, as well as a facing muller and pouring crane. A new cleaning room and additional molding floor facilities have been added. Doyle M. Carbin, formerly with the foundry division of Willys-Overland Aircraft and Electric Auto Lite Co., is president and general manager of the new company.

° ° °

Parkway Foundry & Machine Corp., 59 Paidge Ave., Brooklyn, N. Y., has been formed by Emile C. Mathis, president of Matam Corp., Long Island City, N. Y., and Amicus Most, general manager of the former Parkway Foundry Co., New York, for the production of nonferrous castings.

° ° °

Sam Tour & Co. Inc., New York, has added a department of mechanical engineering to its facilities to handle advisory service and engineering problems in the design of tools, dies, presses, special equipment, plant expansions, etc. E. V. Crane, formerly associated with E. W. Bliss Co., Brooklyn, N. Y., is in charge of the new department.

° ° °

Hood Foundry Works, Covert, N. Y., formerly the Gregg Foundry of that city, has opened for the production of light gray iron castings. John A. Murray, Geneva, N. Y., owner of the foundry, has made extensive repairs and alterations to the old plant.

° ° °

Plymouth Foundry Inc., Plymouth, Ind., recently was reorganized with the following officers: William A. Schlosser, president; Russell L. Rush, vice president; George F. Stevens, secretary; and Anna F. Schlosser, treasurer. The company formerly operated as the Argos Foundry Co., Plymouth.

° ° °

Cutler-Hammer Inc., Milwaukee, has opened a new office at 1404 North Main St., Rockford, Ill., with G. I. Wolff, who has handled the territory for 19 years, in charge. R. E. Ford, who has been in the Milwaukee sales organization for five years, will be resident sales engineer.

° ° °

Fry Lawson & Co., Consulting management engineers, Chicago and New York, have incorporated and will be known as George Fry & Associates Inc.

° ° °

Maritime Brass & Bronze Works, Los Angeles, plans alterations and improvements to its foundry building at 1040 West Lomita Blvd., Harbor City, Calif., to cost $3000.

° ° °

S. K. C. Mfg. Co., Los Angeles, has begun construction of a new foundry building at 19201 South Hamilton Ave., Gardena, Calif., 5220 sq ft in area, to cost $13,000.

° ° °

E. J. Somers Foundry Co. Inc., Belleville, Ill., is now known as the Hy-Grade Foundry Co.

° ° °

Fergus Foundry Co., Division of the Adelsman Co., Fergus Falls, Minn., suffered damage estimated at approximately $150,000, May 28, when fire caused by an explosion in an aluminum furnace, destroyed the plant.

° ° °

Electric Steel & Foundry Co., 2700 South Santa Fe Ave., Vernon, Calif., plans construction of an office and warehouse building at 46th St. and Pacific Ave., that city, 70 x 150 ft, to cost approximately $50,000.

° ° °

Springdale Casting Corp., Waukesha, Wis. has been incorporated by Harold Waldusky, George H. Vierheilig and Wilson J. Lyon, with $2000 capital, to operate a general foundry business.

° ° °

Compton Pattern Shop, Compton, Calif., plans construction of a wood frame, one-story building at 12921 South Alameda St., Los Angeles, 50 x 80 ft.

° ° °

Plans for a new $2,000,000 nonferrous foundry at Meadville, Pa., have been announced by T. W. Pettus, president of National Bearing Division of American Brake Shoe Co. This new plant will replace the old foundry at Meadville and is part of Brake Shoe's $12,500,000 expansion program. It will produce bronze bearings and castings, with facilities providing additional capacity over the old plant. Construction of the concrete and brick buildings is expected to start July 1 and be completed by April 1, 1947. Cost of equipment is estimated at one-half the total expense.

° ° °

Columbian Bronze Corp., Freeport, Long Island, N. Y., has acquired the Doran Manganese Bronze Co. Inc., Brooklyn, N. Y., from the Barth Smelting Co. interests of Newark, N. J. Acquisition of the Brooklyn company, manufacturer of large ship propellers, castings and parts, will enable Columbian Bronze Corp. to expand its own propeller line. The latter company has just completed installation of a large mechanized gray iron foundry, equipped with facilities to handle castings up to 10 ton.

° ° °

Western Foundry & Machine Works, Topeka, Kans., has resumed operation of its foundry which was closed during the war due to scarcity of iron. Hugo Masching has been appointed manager.

° ° °

Burndy Engineering Co. Inc., New York, plans construction of a foundry, machine shop, warehouse, assembly plant, laboratory and general office structure on Walnut and Locust avenues, between 138th and 139th streets, to replace its present facility at 107 Bruckner Blvd.

° ° °

Midway Foundry Co. is the firm name under which Thomas Heredia, Juan Auayo, Edward B. Rois, Ismail Lopez and Ponciano Mageno have published a certificate that they are conducting business at Main and Victoria streets, Torrance, Calif.

° ° °

Whittier Pattern Works is the firm name under which W. H. Stanfield and E. G. Aasen have published a certificate that they are conducting business at 740 South Greenleaf Ave., Whittier, Calif.

° ° °

Charles Hardy Inc., and the Hardy Metallurgical Co., New York, have merged into a single organization which will operate under the name of Charles Hardy Inc., a Delaware corporation.

° ° °

O. J. Whisenand, Wilmar, Calif., has begun construction of a new brass foundry in South El Monte, Calif. The new structure will provide 1500 sq ft of floor space, at a cost of $3500.

° ° °

Aaron Ferer & Sons plans construction of a foundry building at 2300 East

Eleventh St., Los Angeles, a steel frame and corrugated iron structure, 100 x 132 ft, to cost $40,000.

° ° °

Harry W. Dietert Co., Detroit, has sold its interest in the sales and service of spectrometric equipment to Applied Research Laboratories, Detroit, and will concentrate on sand research, and on the sales and manufacturing of sand testing equipment and carbon and sulphur determinators.

° ° °

A pattern shop building is being erected at 4831 East Patata St., Los Angeles, for the Jackson Iron Works, covering 2400 sq ft of floor space, and to cost $12,000.

° ° °

A gray iron foundry building is being erected at 5310 Southern Ave., South Gate, Calif., for Henry J. Bork, at a cost of $25,000.

° ° °

Chester Mfg. Co., Lisbon, O., has incorporated and will be known as Chester Hoist Co. Hal F. Wright is president, Mary T. Wright, vice president, and Harry E. Hill, secretary-treasurer of the company.

° ° °

Benton Harbor Malleable Industries, Benton Harbor, Mich., plans construction of a malleagle foundry to cost about $500,000.

° ° °

Stuart Foundry Co., Detroit, has let contract for a foundry addition to cost about $60,000.

° ° °

Frantz Mfg. Co., manufacturer of washing machine parts, will move its gray iron foundry from Minerva, O., and its aluminum foundry from Canton, O., to 3650 East 93rd St., Cleveland.

° ° °

Davis Pattern & Mfg. Co., 16909 Divernois Ave., Detroit, has been incorporated by P. B. Bloch, with $50,000 capital, to manufacture foundry patterns.

° ° °

Baker Industrial Truck Division of the Baker-Raulang Co., Cleveland, has appointed J. K. Mahaffey & Son, 1006 Pitt Bank Bldg., Pittsburgh, as representatives in the Pittsburgh area, succeeding Criss & Mahaffey

° ° °

Acme Foudry Co., 2503 — 22nd St., Detroit, is planning to remodel and modernize its plant, with the addition of new equipment and new plant facilities. Work on this project, which will be undertaken in the early fall, will not interfere with production.

° ° °

Berlin Casting Corp., Berlin, Wis., has been incorporated with $4000 capital, by Frank Hunt and associates, to manufacture metal castings.

Build up PATTERNS with Celastic Colloid Treated Fabric

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(SUITABLE FOR PRODUCTION PATTERNS!)

SAVE TIME! LABOR! AND MATERIAL!

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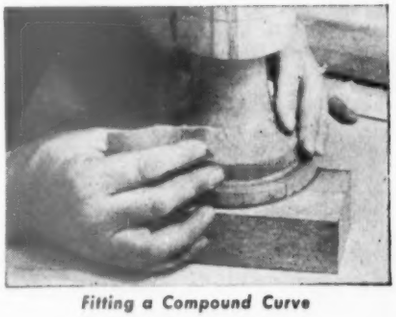
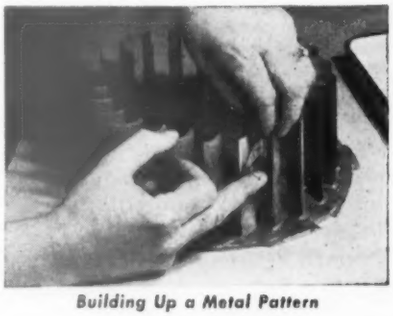


Fitting a Compound Curve



Building Up a Metal Pattern

Hundreds of Pattern Shops and Foundries are finding this new lagging plastic the answer to many of their most difficult problems in building up patterns to any required thickness. It saves patterns that would otherwise be scrapped. It enables them to deliver jobs on time. It saves waste due to last minute changes in design. It is ideal for repairs also! Write for full details, easy directions for use, complete specifications and prices.

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PATTERN SHOP SUPPLIES
TOOLS FOR PATTERNMAKERS
POWER TOOLS AND EQUIPMENT
PATTERN LETTERS & FOUNDRY MARKS

The Adventures of BILL

By PAT DWYER
Drawings by RICHEY

INSTEAD of toiling and moiling like a slinky yellow dog," Bill remarked the other night, "for the greater part of a long and useful life, trying to get a grip on the foundry business, I wish I had grabbed me off a job as a newspaper reporter. He starts off knowing nothing about anything and keeps on learning more and more about less and less until finally he knows everything about nothing. He then is in position to write columns and columns of what he thinks—save the mark—and that material is spread on the pages of the Great Daily Press, the bulwark of our civilization and liberty as a free and independent people, and the source of most of our misinformation."

"Well," I admitted, "you seem to have most of the necessary attributes. You start off by quoting the old worn-out and standard reference to a yellow dog, the very acme of misery. About three steps below a starved Chinese coolie. A moment's calm reflection should convince you that no comparison exists. The terms 'Working like a dog' or 'Leading a dog's life' are intended to convey the impression of a hopeless, miserable state of existence. As a plain matter of fact, a dog perhaps is the luckiest, most carefree member of the animal group. A champion parasite. He NEVER works. From the day he is born out under the old red barn, until the day he dies under a truck or something, he contributes absolutely nothing to justify his existence. He is fed and housed and washed and pampered and all he has to do is loaf around all day yawning and begging for food, and lie around all night where the owner can trip over him.

" 'Tis true, the dog and his mother have insinuated themselves into the language to some extent, but the references usually only occur under the stress of strong emotion, and under no consideration or circumstances can be considered either accidental or complimentary. However, you will pardon this dog digression. You were saying something about a wasted life, all because you did not reach out of your sally switch cradle and grab a pencil instead of a trowel or double ender. May I ask what prompted you to throw the old mind—if any—into this particular groove?"

"Indeed you may, my boy. Asking questions is one of the few remaining privileges we still continue to enjoy under our benevolent and paternal government. The answer to your present interesting question is contained in this long clipping from the *Grove City Reporter-Herald*, entitled "As We See It, A column of Comment Devoted To News and Views" by Floyd McClymonds. The column is headed by the familiar quotation from Voltaire: 'I wholly disapprove of what you say, but will defend to the death your right to say it.'

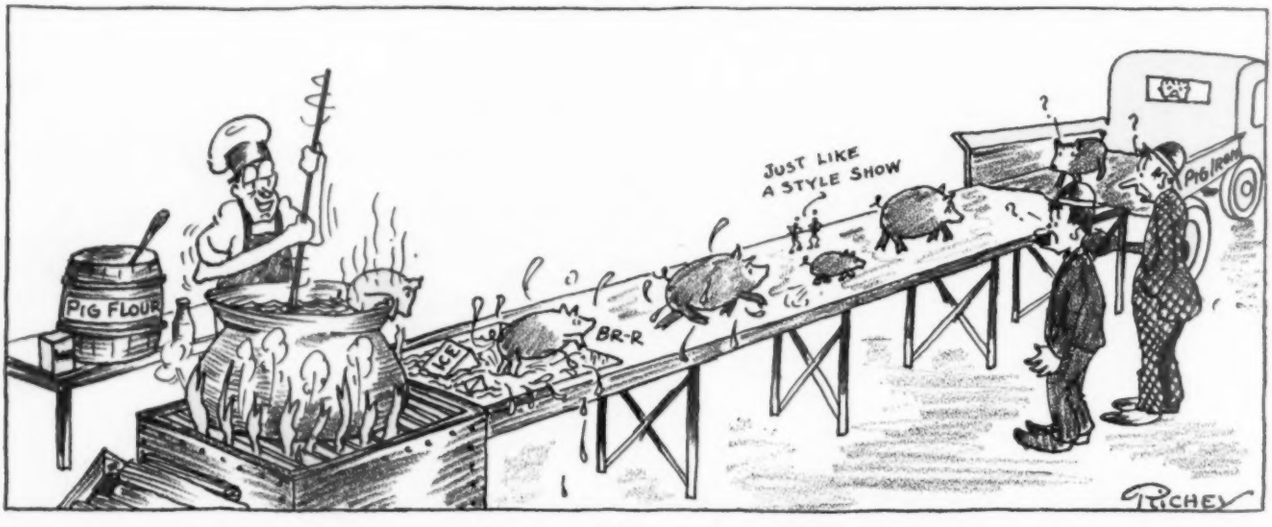
"I don't know about this here now defending to the death stuff, but old Vol apparently could throw his shafts pretty close to the bull's-eye.

"This clipping—or story, as we newspaper boys say—is an account of a meeting of the Northwestern Pennsylvania foundrymen in Grove City, where Thos. E. Eagan presented a paper on "Some Aspects of the Physical Metallurgy of Gray Irons." As chief metallurgist of the Cooper-Bessemer Corp., here is where Tom shines, a star of the first magnitude. The newspaper lad who covered the story for his paper, admits that the whole subject was over his head, but that did not prevent him from writing about it to the extent of approximately 1000 words. I wonder what he could do if he had a subject with which he is familiar. Listen to this:

Over night your newsboy has acquired a comprehensive knowledge of the finer details of foundry practice, and feels that he is entitled to consider himself a qualified sand rat. It is true that he has yet to set foot inside his first foundry, and is a bit vague about what goes on in there. He does not know for sure whether they press the stuff, pound it, cut it, or pull it like taffy, but it does seem a shame to hoard all this newly acquired knowledge of a fascinatingly important science.

"Nothing could be fairer than that. Notice the old human interest touch where he nonchalantly tosses in the sand rat. This is the kind of intimate stuff that holds the reader's attention and proves that the writer is in the inside

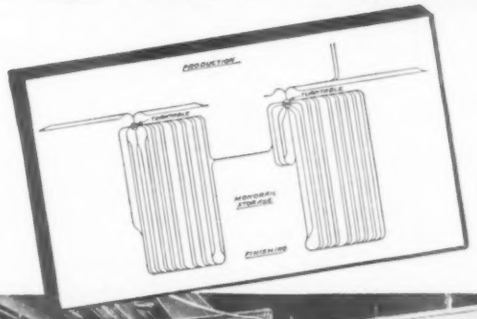
(*Continued on page* 208)

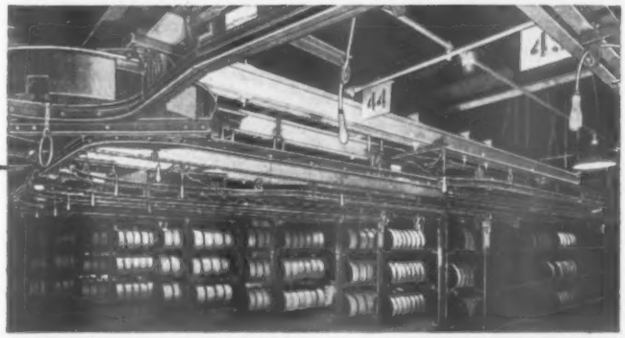


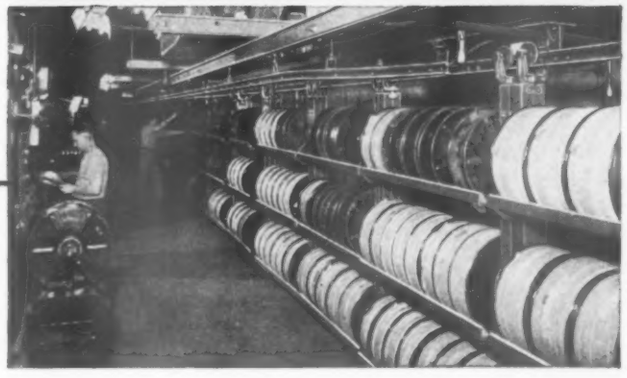
Foundrymen on tour of inspection are properly impressed and edified by hitherto unknown method of producing pigs

FLEXIBILITY

of AMERICAN MONORAIL EQUIPMENT Solves Difficult Handling Problems







Here is another of the hundreds upon hundreds of handling problems efficiently and economically solved by American MonoRail Overhead Handling Equipment.

THE PROBLEM: To eliminate manual handling of reels from production machines to storage, from storage to finishing, from finishing to storage or shipping as required.

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THE AMERICAN MONORAIL COMPANY

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(*Continued from page 206*)

ring."

Let's drop the 'he' and 'we' in favor of the less complicated 'I'. Shall we? I then owe my new status as a foundry expert to Tom Eagan, and to exposure to 75 fanatic foundrymen, here Wednesday night to talk shop. To a man they fairly oozed enthusiasm for their profession. Their zeal for information was so infectious that in no time at all I was equally breathless as I hung on every pearl of wisdom as it fell from Tom's lips. And don't think they weren't pearls either. Those veteran foundrymen, many of whom own and operate successful businesses, convinced me by their rapt attention, that they were soaking up wisdom at every pore.

"Before I finished reading that paragraph I felt sure the inspired writer was leading up to a bit of an emotional climax with cries of Amen! and Halle-looyah and with tears dribbling from the old, faded eyes of the elderly members. Instead of that they merely oozed enthusiasm, hung on every pearl and soaked up wisdom. It would be interesting to learn how a man can ooze and soak up stuff at the same time. You figure it out."

It all started out very simply. A normal crowd of men, normally interested in good food. The social amenities, however, were disposed of with the salad. I discovered that my conversation with Douglas James, a former Grove City College football player, had become a monolog. He was looking at me, but listening to Mr. Gebhart on his left who was talking about something called heat to the man on *his* left. At my right a Mr. Peters was arguing with Howard Kelly across the table. A trifle miffed I consoled myself with a bit of cottage cheese and a pickle.

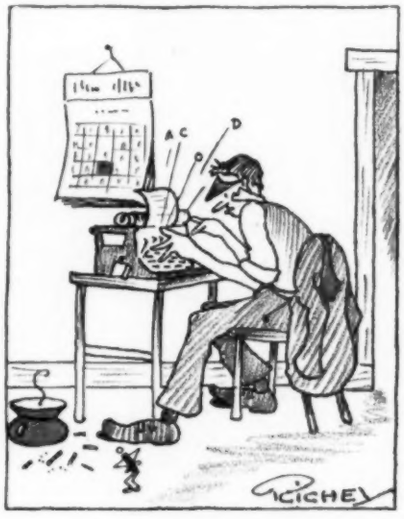
"A tough spot, indeed for our hero. Bursting with important conversation and no one willing to listen to him. Did he rise to the occasion, as heroes ever have risen since the art of storytelling was invented? Did he? What a question! He reached over and consoled himself with a bit of cottage cheese and a pickle. Unfortunately, he neglects to state whether the pickle was a sweet or a dill. Also what was wrong with the celery and olives? One trusts that he used the proper tools while reaching across and smuggling the extra portion of food to his plate."

All around the tables men were letting their mashed potatoes grow cold. Across from me Howard Kelly and Scotty Clark, who deal with brass and bronze, were discussing this gray iron stuff with somebody. This was either a crowd of screwballs I'd got mixed up with, or a group so interested in their job, they had time nor appetite for nothing else. I decided on the latter, got over my sulk, and began to wonder what gray iron was. I never did find out, but just ask me about tensile strengths and graphite flakes and watch me give out.

"Now we are getting into the highly technical stuff. The reader begins to realize that all this preliminary twittering merely is the orchestra tuning up. Presently with a taran-ta-ra on the trumpets and a roll on the drums we shall be off."

The apple pie and ice cream was splendid and everyone ate it, but I alone tasted it. The arguments were getting hotted up. Doctor Hoyt spoke briefly and they set up a projection machine, as Tom Eagan mounted the podium. He said lack of time would prevent him from going exhaustively into the physical metallurgy of gray irons. I felt sleepy. Then I felt a sort of an electric impulse in the air and noticed the men listening intently. Thinks I there must be more to this gray iron stuff than meets the eye.

"That podium had me stopped. I had a vision of Tom mounting everything from a gaily painted hobby horse to a step ladder, but none seemed to fit. At one time or another I have heard some rare and wonderful words tossed around nonchalantly at technical meetings, but so far as the old memory served this was the first time any person had sprung this podium thing. Do you know any-



His brow is wet with honest sweat

thing about it?"

"A perfect stranger to me," I said. "Let us see if the late Mr. Webster had it in his justly famous collection. Well, what do you know? Here it is, podium. From the Latin if you please, an elevated place or balcony; in architecture a continuous projecting base or projection. Several other meanings given, but the foregoing should help you over the stile. Kindly proceed with this interesting narrative. What's that? Take another gander through the dictionary."

By listening intently I soon discovered that tensile strength in foundry castings is more important than anything except one thing and I forgot to write that down. You put in a pinch of this and a dash of that and you get the heat just right and pour it at the right time and you get 40,000 pounds of it per square inch, or is it 30,000 pounds per square foot? But of course you have to get your graphite flakes properly distributed in the ladle. Graphite flakes are so important that I must tell you about 'em.

"It must be a gift. Millions of words have been written and spoken on various phases of the casting industry. Veteran foundrymen, without exception, modestly admit that they never expect to graduate from the student ranks. They will always be learners. Clearly that is because, up to the publication of this story, no person had the courage, the intelligence and the amazing skill to compress a description of the foundry process into one paragraph. A pinch of this and a pinch of that! Heat it up, stir in a few graphite flakes and you get 40,000 tensile pressure per square inch or square foot or something depending on whether you use the centigrade or fahrenheit scale."

Graphite flakes are what make gray iron gray, as we get it. A solid streak of graphite flakes through a casting is very bad, because graphite has no strength. A ball of it in the middle unmixed and you've got white iron, and if it's gray iron you want, that's just too bad. Are we quite clear? Of course there's such terms as silicon, manganese, pearlite, ferrous and nonferrous, etc., evidently important, but we did not get 'em all figured out.

"For one in a comatose condition, loaded to the plimsol mark with pie a la mode, cottage cheese and pickles, he did pretty well in catching the terms silicon, manganese, pearlite and ferrous. However, this here now nonferrous gray iron must be something new. Maybe it is one of Senator Claghorn's jokes, son. Giving that eminent southern champion, suh, a chance to say a few words about uniform gray iron and gray Confederate uniforms!"

When the boys got to the subject of the arbitration bar, they practically quivered with excitement. We could be wrong, but we believe an arbitration bar is sort of standard for the entire casting. They make this bar about an inch in diameter and about so long, and when they get that right as to tensile strength and that other thing we forgot about, they try to get the entire casting just like it as to content. It seems the bar sometimes lets 'em down and the casting isn't like the bar at all. What to do?

Well, the boys really went to work on that bar, and it soon became clear to me that the arbitration bar ranks in importance with the bar of justice. 'Beat Me Daddy, Eight To The Bar,' and the main prop in the academy award film 'Lost Week-End.' When they lick this problem, they can reduce to a more exact science an operation that now requires in addition to vast knowledge of metals, a lot of luck and no little inspiration. They're really working on this one.

Fascinatin' subject, and I'm awfully glad I've mastered it. I'm kiddin' it today because I cannot do anything else with it. I was so deeply impressed with the obvious earnestness and zeal for information shown by men who rank high in their industry that I can't get over it. Then too, foundry work appears to be the very foundation of America's vast industrial system, and its importance cannot be over emphasized. It's inspiring to meet a group of men so fanatically

dedicated to improving their output.

"A most remarkable story," I declared. "Do you think it will be incorporated in the *Transactions* of the American Foundrymen's Association?"

"No," said Bill. "I shall not be surprised to find it in a new edition of *Grimm's Fairy Tales* under the title Slips That Pass In The Night!"

Book Review

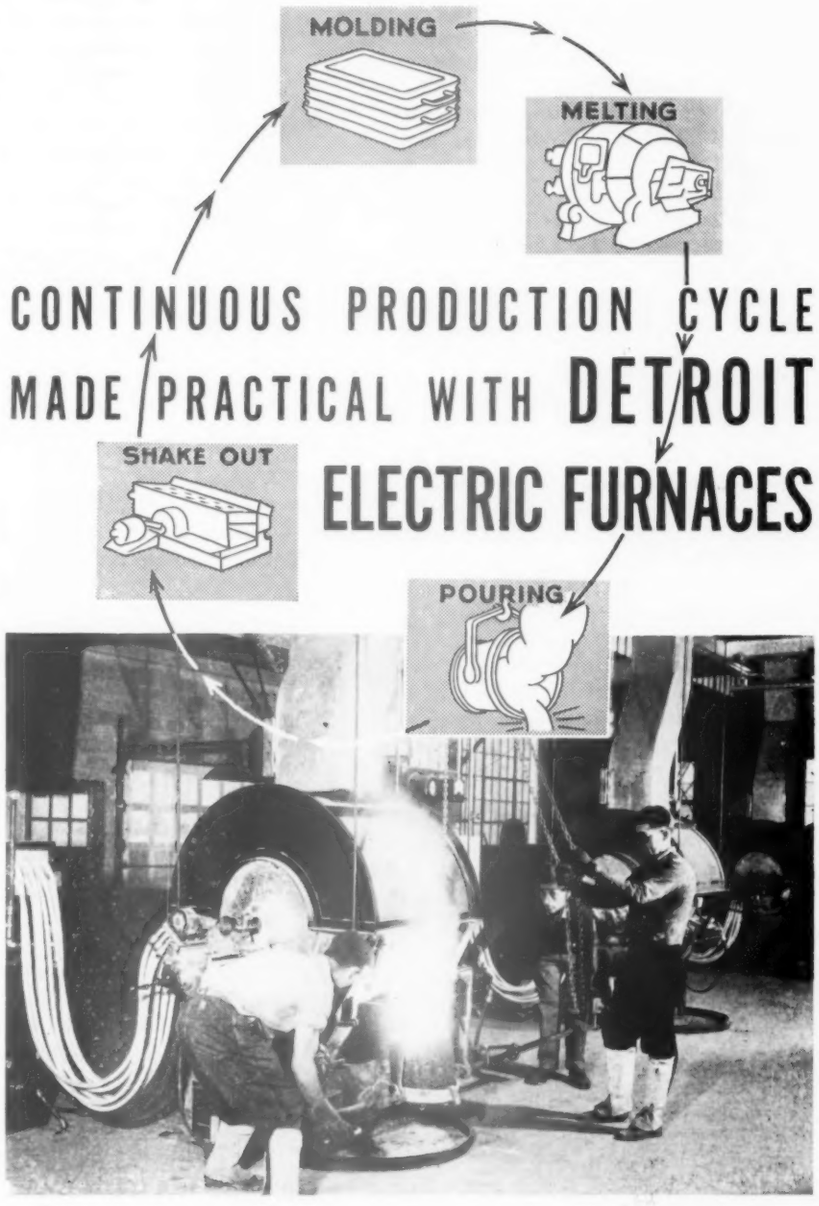
Lebanon County Through the Centuries; 36 pages 8½ x 10½ in.; compiled by Arthur D. Graeff and illustrated by Florence Starr Taylor.

In a foreword to this attractive brochure, W. H. Worrilow, president, Lebanon Steel Foundry Co., refers to the early history of the iron industry in Pennsylvania and to the establishment of the Lebanon Steel Foundry in 1911. For all who will enjoy them, Lebanon holds and is heir to many fine traditions in and beyond the iron trade.

Personnel of the Lebanon Steel Foundry are descended from a long line of sturdy men and women who lived useful and active lives. In the belief that many friends of the company and its well-known symbol, the "Circle L," will be interested in the surroundings, historical, industrial and cultural, the brochure is employed as a means of introducing them to the Lebanon valley, the cross bar in a capital *H* made by the Schuylkill and the Susquehanna rivers. The artistic illustrations on every page convey the impression of ancient wood cuts. Table of contents includes "The Genesis of Iron in Lebanon," "Fort Zeller," "The Past Is With Us Yet," "of Bearded Patriarchs," "Roses Red and White," "White Ships that Rolled on Wheels," "A Touch of Old World Splendor," "Cornwall," "The Miller's Mansion on the Millbach," "Star Gazing," "The Neck of the Bottle," "Every Able-Bodied Man," "The Domain of Abundance," "The Blacksmithy Astronomer," "Lebanon Bologna," "Canning Co-op."

Opens New Technical Service Office

International Nickel Co. Inc., New York, has opened the Empire State technical section of its Development and Research Division, in the Genesee Valley Trust Bldg., Rochester, N. Y., where technical assistance will be furnished to industry in New York state, excluding New York city, the Albany area, and the Hudson River valley. Gilbert L. Cox, metallurgical and chemical engineer, who recently was released from active duty with the Army Ordnance Department, and who has been associated with International Nickel since 1931, will have charge of the new office.



400 lbs. of brass every 6 minutes! That's the day-in, day-out production record of a battery of five Detroit Rocking Electric Furnaces, Model LFC, 125 Kw, 350 lb. nominal cold charge capacity.

In a typical 9-hour day, these modern furnaces melted 17 tons of 85-5-5-5 red brass. Because the Detroit Electric Furnace affords complete control over all melting factors, the melting cycles of all five furnaces are easily timed in sequence. The result is virtually continuous tapping of 400 lb. heats in two 200-lb. ladles—regulated, controlled production integrated with a conveyor system to keep material flowing through charging, melting, tapping, shakeout, and other operations at a steady pace.

Our engineers will be glad to study your foundry set-up and suggest a layout of Detroit Electric Furnaces that will put your metal melting on a continuous, profitable production basis. Write for complete particulars.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

WHY SPECIFICATIONS?

(*Continued from page* 101)

anical stability and structural stability may have been risked.

Specification making is not the simplest of the tasks which confront the engineering professions.

Specifications are too numerous. A few years ago there were some 40 differing specifiactions for the common 85-5-5-5 alloy. Specifications aren't always logical. Part of this is due to usage of too many opinions and too few facts, to commercial pressures, to paucity of research, etc.

Shortcomings in the specification situation purposely have been stressed in the hope that all may realize their responsibility for attempting to improve it. Problems in the specification field are clarification, simplification, correlation, much more research, and more widespread knowledge of what useful and indispensable tools specifications are. Of the many thousands who use specifications, a very few really get together and do the work necessary to formulate them. These few have done a tremendous and relatively effective job. Any thoughtful person who reviews conditions as they were, say 20 years ago, must needs be impressed by the great advances made since that time. That even greater advances have not been made is due to lack of support by those who want to get all and give nothing. Such practice obstructs the road to progress.

Specification making implies thorough knowledge of manufacturing and trade practices plus clear understanding of necessary service characteristics (and tests to assure their probability). It is true that there are many specifications evolved by consumer groups—the largest being the federal agencies although a number of other large consumer groups also issue specifications, and not a few companies have their own specifications. Likewise, various manufacturing trade groups work out specifications to be prescribed for their products. Since specifications are elements in contracts it is obvious that unilateral evolutions, such as mentioned previously, sometimes are not to the ultimate best interests of the contracting parties. Among other difficulties is that these "individualistic" (as opposed to "co-operative") efforts are largely responsible for a huge and intricate mass of specifications which are barriers to a proper simplification and coordination in these matters.

The evils of "individualistic" specifications were recognized early by thoughtful consumers and producers, and resulted in formulation of the American Society for Testing Materials shortly after 1900. ASTM specifications are evolved by committees composed of *both* consumers and producers. It is this "common meeting ground" principle which has helped to make the ASTM the world's leading specification body. The purposes of the ASTM are: 1. Research and the evaluation of the properties of materials. 2. The reduction of this and other knowledge into sound and practical specifications and methods of test.

Many consumer and producer groups, also numerous individual companies, use ASTM specifications by direct reference. Others modify them for their own real or fancied needs. A considerable proportion of more purely "individualistic" specifications will be found to follow in part features of ASTM specifications, and especially ASTM methods of test.

The war made industry far more specification conscious. Conflicting and overlapping specifications for essentially the same materials doubtless produced many heartfelt curses, not to say confusion, delays and expense.

It is significant that the American Standards Association in its great simplification program has adopted numerous ASTM specifications.

Naturally, many of us on first thought would like to see complete unity in materials specifications. As an ideal such unity deserves earnest promotion. Practically, it has some dangers to be guarded against constantly. One of these is that at times a really necessary requirement or provision may not be in an existing specification. Usually such requirements are more imaginary than real, but at times they may have sound justification. Sometimes, specification-making bodies move too slowly to meet new needs promptly. Where facts and research are inadequate such slow motion may be justified. Delays sometimes are caused by deference to democratic practices. Autocratic procedures are undesirable. However, it at times happens that an individual or even a clique stalls action, usually because of ignorance of the principles involved and consequent fear of results.

Compromise Usually Necessary

Most specifications necessitate sound compromise, and sometimes we humans can be very stubborn, even on inconsequential points! A danger in standardization is inclination to "freeze at current level" and thus block progress. The author is inclined to discount this factor, because developments have a way of bursting such artificial fetters. As long as competition exists, regimentation of any phase of engineering progress is not too likely.

So far the author has attempted to outline the general philosophy of materials specifications, their implications, their difficulties, and the desirability for continuing progress in this field. Because the utility of and need for specifications seems so apparent, he has given more space to describing limitations and difficulties concurrent with genesis of these powerful tools.

Let us turn now to specific if brief consideration of two rather widely used and typical ASTM specifications, A-48 for general gray iron castings, and B-61 for valve bronze. Each begins with a scope clause, indicating the purpose and application of the specification.

The iron specification proceeds with a tensile strength classification, which pre-

CAST JOURNAL BOXES: William L. Batt, back as president of SKF Industries Inc., Philadelphia, after wartime service as vice chairman of WPB in Washington, inspects journal box castings on the new production line the company has set up to make this equipment. Used in conjunction with roller bearings, the boxes are designed for railway passenger car use

scribes the minimum tensile requirement for each of the classes.

Transverse test is optional. The option right is not prescribed. Where designation is not made, the assumption is that mutual agreement is implied.

Prescription of deflection is restricted to mutual agreement. A large amount of study was given to this provision. Compilation of data from many sources showed wide scatter in the deflection values of irons of similar transverse strength. After much consideration, the committee wisely decided (in 1933) that too little was known of the meaning of this test to prescribe it. The consumer-producer agreement was incorporated in deference to possible if not known consumer needs, and as of possible interest in control. It was re-emphasized that the purpose (scope) of the specification is to classify gray irons according to tensile strength.

A nominal table is given for transverse loads corresponding to tensile classifications. The basis of choice of loadings is described. A mutual agreement clause also is provided.

Study Thousands of Tests

In case of transverse loads versus tensile classes literally thousands of test results were assembled and studied in respect to ratios, maxima, minima, and average. Very definite subdivisions of thought appeared in the committee. Some members held out for maxima, some for minima, others for average. It took over a year to compose these differences. To finally resolve the matter, the clause 3(d) was added. This provides the right to put the relationship to direct test.

It would have been relatively easy to establish various arbitrary relationships. This would have simplified the clauses of section 3 somewhat. However, such simplification would have been without complete equity, and would have lacked engineering accuracy. Therefore, the committee supplied simple direct means for use where maximum simplicity might be desired, and provided other means where questions of equity and accuracy might arise. A good specification provides for recognized contingencies.

Section 5 on correlation of test bar and casting was a decided forward step in specification of engineering irons. Pre-existent specifications claimed to establish the so-called "quality of iron in the ladle." The engineer is interested in the quality of iron in the casting. Gray iron is affected markedly in strength and other properties by the rate of cooling from the molten condition. This is a function of section size. An iron perfectly suitable for a given section size may be wholly inadequate for another.

Section 5 is not lengthy. Its recommendation of three sizes of test bars to correspond to three ranges of controlling section sizes is rather simple. However, this particular section is backed up by perhaps as much research as any known specification provision. Many papers were presented in the period 1927-1933. They covered numerous types of gray iron, cast into many section sizes. This work was undertaken in co-operative spirit, and represents expenditure of many thousands of dollars. Various conventional bars and plates were studied, also test pieces taken from castings.

Today any engineer can select and get what he wants and needs in the casting, and can use section 5 as a final specification "measuring stick." All that is necessary is study of texts which describe mass effect, proper consultation with metallurgist and foundryman to assure sound design and casting, and sensible selection of suitable metal and bar size.

The balance of the specification is noteworthy only for section 11 on chemical composition in that specific compositions are omitted. The reason is that a number of different compositions may serve to achieve the end result, a prescribed tensile strength. In fact, two foundries using the same chemical com-

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Chicago, Ill	B. J. Steelman
Chicago, Ill.	Wehenn Abrasive Co.
Cincinnati, Ohio	Delhi Foundry Sand Co.
Coldwater, Mich.	The Foundries Materials Co.
Detroit, Mich.	The Foundries Materials Co.
Dallas, Texas	Barada & Page, Inc.
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Houston, Texas	Barada & Page, Inc.
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position may produce different tensile strengths! As Gillett (*An Engineering Approach to the Selection, Evaluation and Specification of Metallic Materials*) says, the idea is to provide square pegs for square holes. Omission of composition requirements greatly facilitates getting the square peg. In other words, the ends are prescribed, and the means left to those responsible for achieving the ends.

The B-61 (valve bronze) specification is used to illustrate another condition, one which took some very careful research to reveal. It will be noted that B-61 does have quite definite chemical prescriptions. Yet it is perfectly true that the tensile test requirements of B-61 could be met with much broader chemical prescriptions. In fact, they could be met by several distinctly different bronze compositions. Why then the difference from A-48 in this feature?

Footnote 3 states that B-61 is prescribed by the ASME Boiler Code for temperatures to 550 F. Temperature is the major limiting factor. Room temperature tensile strength is significant from another angle.

Make Peg Fit The Hole

A bronze with 8 or 10 per cent Sn would be as strong or stronger. Years ago such compositions were advocated and used by some. Creep tests and structural stability studies showed that somewhat above 6.5 per cent Sn, such bronzes become embrittled at 550 F. A secondary and non-ductile component is precipitated. This was *not* to be expected from "scientific" (?) equilibrium diagrams then available in textbooks. The present chemistry of B-61 is an indirect but effective means of being sure that the peg can fit the hole.

The tensile strength requirement insures that the metal is potentially sound. Low strength values are concurrent with metal lacking in density. This fact was revealed by research and by long practical observation. Thus the combination (chemistry and tensile) insures that the metal can "fit the hole" properly.

Attention is directed toward section 13 on certification. In commercial work, to test every heat would be cumbersome and expensive. Manufacture is in small heats, representing perhaps 200 lb to, at most, about 1000 lb of castings each. Identification and tests on each heat would cost more than molding and coremaking for the castings themselves! Considerable statistical study was indulged in before the certification clause was adopted. Frequency charts indicated the probabilities, and thoroughly justified the clause.

Certification is not 100 per cent inspection. It is justified when studies of thousands of tests show that the probabilities of certification sampling involve no injustice to the consumer. Such justification is merited when proper controls are exercised by the manufacturer and when he is honest. It has been said that the integrity of the producer is more important than the context of a specification. Certification admittedly is susceptible to skulduggery. So are individual test requirements. This fact discloses a danger to the consumer. If the consumer tries to prescribe each and every minute detail, he assumes a large degree of responsibility, perhaps far more than he realizes. Yet he cannot legislate morals. Valuable though specifications are it must be borne in mind that the spirit is fully as important as the letter of the law.

As Gillett implies, avoid the position where the supplier has to comply only with the letter of the specification. Contractural relationships—including materials specifications—are definitions. Mutuality in intent is a plus factor which is helpful toward assurance of performance.

Defects in Nonferrous Centrifugal Castings

(*Continued from page 93*)

metal is introduced into the mold at approximately the same rate as the metal inside is freezing, giving directional control over cooling and solidification. Normal static casting procedure would be followed in this case as far as temperature is concerned, since heavy wall castings should always be poured at the lowest possible temperature.

The ultimate limit of wall thickness is reached when the cooling rate from the inside of the casting becomes appreciable in comparison with the heat extraction from the outside of the mold. Because metal molds will extract heat from the casting more rapidly than sand-lined molds, they will produce castings of greater wall section.

Successful deviations from standard centrifugal casting procedures require a knowledge of the conditions which arise when they are carried too far. This same knowledge is also extremely helpful in determining the causes of defects encountered in castings produced under normal operating procedures.

An excessive rate of pour often results in "raining," as indicated in Fig. 1. This is when the metal, upon entering the mold, does not quickly reach a high enough rotational speed to hold it against the inner wall of the mold. Instead, it is carried to the top of the mold, where it drops off like rain. Metals which are particularly subject to drossy conditions should definitely be kept from "raining."

Since raining is caused by lack of "pick-up," or failure of the metal to accelerate quickly to a satisfactory rotational speed, measures other than a reduced rate of pour are often effective. Lowering the pouring temperature will increase the viscosity of the metal and aid the rate of pick-up; and a rougher mold surface, by increasing metal-to-mold friction, will also reduce raining.

Sometimes, conditions which would cause raining if they were more severe, will produce a casting which, when broken, shows a definite separation between the inner and outer portions. In this case, solidification has taken place before all of the metal within the mold has reached the mold's rotational speed.

Too low a rate of pour, on the other hand, will in many instances cause cold-shuts or incomplete filling of the mold. Closely allied with a slow pouring rate, in that it will cause a cold-shut virtually every time it happens, is an interruption in the flow of metal from the runner pot to the mold. A continuous flow of metal during the filling of the mold is extremely important, and every precaution should be taken against possible interruptions.

Eliminate The Human Element

Because the rate of pour is so important in the production of centrifugal castings, it is desirable to eliminate the human element in so far as possible. This can best be achieved by using a nozzle type runner pot in which the pouring rate is determined by the nozzle opening diameter.

An incorrect pouring temperature also will cause defects in castings. If the metal is poured at too low a temperature, cold shuts or incomplete filling of the mold will often result.

Too high a temperature causes dross, metallurgical inferiority, or, due to the prolonged opportunity for gas absorption, holes in the casting. In general, the best temperature is the lowest possible with the type of mold and the kind of metal being used.

Excessively high or low rotational speeds will cause such unwanted conditions as raining, cold shuts, incomplete mold filling and excessive dross on the inside diameter.

Incorrect rate or direction of cooling will cause center-line shrinkage or hard spots.

For centrifugal castings of the type under discussion, the rotational speeds generally used are from 60 to 75 G for sand-lined molds, and 40 to 60 G for permanent molds, metal or graphite. (See Fig. 3).

In striving to obtain the best possible combination of pouring rate and temperature, speed of rotation and the rate and direction of cooling for a particular job, it is necessary to consider the type of mold being used.

Metal molds, because of their heat extractive ability, generally require higher pouring temperatures. For the same reason, lower rotational speeds are generally used with metal molds, the faster heat absorption of the mold increasing the viscosity of the metal, thus enhancing its pick-up. This same rapidity of heat extraction makes it necessary to use a higher pouring rate, as compared with sand molds.

On the other hand, sand molds are usually preferred when the length of the casting is more than 15 times its inside diameter, since trouble is usually encountered on a production basis when this ratio is exceeded in a metal mold casting.

With either type of mold, but particularly in the case of metal molds, the use and proper application of mold wash is extremely important. The wash should be sprayed on, rather than brushed. Spraying will produce a rough surface that will increase the rate of pick-up. Properly applied, the mold wash will permit the use of a lower pouring temperature, a slower rate of pour and a lower rotational speed.

Defects in Four Classifications

Once these principles and characteristics of centrifugal casting are understood, the reasons behind the recommended corrective measures for the more common defects now to be discussed will become apparent. Most of these defects fall into four general classes: Holes, cold shuts or incomplete filling of the mold, high hardness or hard spots, and excessive dross or pits on the inside diameter.

Holes, in addition to being created by gas in the metal or mold material, can also be caused by incorrect cooling or an excessively high pouring temperature. Recommended corrective measures include elimination of gassing possibilities, use of an exothermic pipe eliminator to promote uni-directional solidification, a reduced pouring rate after approximately half of the metal has been introduced into the mold, and pouring at the lowest temperature possible without causing cold shuts.

Cold shuts or incomplete mold filling usually result from the metal solidifying before it is properly in place. These difficulties generally can be eliminated by using a higher rotational speed, a faster rate of pour, a higher pouring temperature, a thicker coat of mold wash (at least 1/32-in.), or a hotter mold.

Excessive dross or pits on the inside diameter can result from raising, and the most effective curative measures include: Lowering the pouring temperature, increasing rotational speed, or reducing the pouring rate either from the start or after half of the metal has been poured.

High hardness or hard spots generally result from incomplete mixing of the metals in the melt, or from incorrect cooling. Careful stirring of the melt to insure a homogeneous mixture, and the use of a thicker coat of mold wash or a hotter mold will generally eliminate these conditions.

These are the most common defects encountered in nonferrous centrifugal castings, and the measures which have been found most effective in correcting them. Others occuring less frequently, may appear occasionally. If they do, application of the principles and requirements of centrifugal casting in the search for causes should prove helpful in their elimination.

Aircraft Foundry Co. plans construction of a new foundry building in Huntington Park, Calif., 50 x 140 ft, to cost $25,000.

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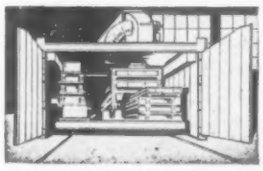

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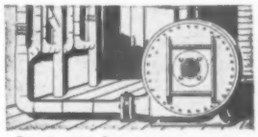
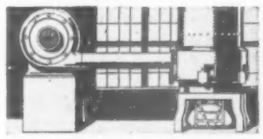


Sturtevant Compressors—hold air pressure constant, in supplying blast to oil or coke burners. Lifetime efficiency, minimum maintenance; worthwhile power savings.



Sturtevant Cupola Blowers—assure smooth, constant pressure supply of air. Compact, simple, sturdy construction; sizes and types for all conditions.

Sturtevant Dust Control—pioneer experience in engineered systems for collecting dust from snagging, tumbling and sandblasting operations.

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Sturtevant's Foundry Shake-out System is the sure cure for your shake-out dust problems—improving working conditions, speeding production, and prolonging the life of foundry equpiment.

No more clouds of smoke, dust and fumes to slow production when Sturtevant's "air-at-work" draws off the shake-out dust as quickly as it is formed. In hundreds of outstanding foundries, savings in increased working efficiency, longer equipment life, and reduced maintenance, have quickly repaid the initial cost of the equipment.

Check up on your shake-out room today. Then call your nearest Sturtevant office for recommendations on a system to meet your particular needs—or, write to B. F. Sturtevant Company, Division of Westinghouse Electric, Hyde Park, Boston 36, Mass.

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Sturtevant
Puts Air to Work

B. F. STURTEVANT COMPANY • DIVISION OF
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Casting Soil Pipe and Fittings

(*Concluded from page* 104)

melting at the rate of 5, 9 and 14 tons per hour. Spouts of the two larger cupolas are bent to deliver metal to a reservoir or mixing ladle, from which it is transferred to a constant succession of 1000-lb capacity bull ladles. These ladles, suspended from a monorail system, deliver the metal to all the pouring stations according to a program that eliminates any delay in the production schedule.

Approximate analysis of the iron in the castings shows: Total C 3.35 per cent; Si 2.25 per cent; Mn 0.60 per cent; S 0.08 per cent; P 0.55 per cent. The analysis may vary to some extent without affecting the cupola operation or the utility of the finished product. Probably the most essential feature in the entire cycle of operation is the necessity of tapping the iron at exceedingly high temperature, usually in the vicinity of 2800 F. Obviously, the most exacting and jealous care and attention must be exercised to keep metal in maximum quantity and at a maximum temperature, flowing from the spout for a period of 8 hours. A direction sheet, 12 x 18 in., is posted on the charging room wall as a constant reminder to the men who do the charging. Here, as in nearly all present day foundries, the days are gone when a veteran crew could be depended upon to carry on with little or no supervision; when old Joe, or Tom or Dick, with a service period that entitled him to still address the chairman of the board familiarly by his first name, was in charge of the job and did not need, and usually would not tolerate, advice or instruction from any person, high or low. The old plodding, faithful retainer has passed and the new candidates show a remarkable and complete lack of interest in building up any kind of a continuity of employment record.

The instruction sheet has four illustrations marked 1, 2, 3 and 4, showing successive stages in lighting the coke bed in the cupola. Long experience has demonstrated the efficacy of the method in starting the heat off properly, in securing metal of maximum temperature from the first tap to the last. Following are the detailed instructions; the numbers 5, 7 and 9 on the sheet refer to the cupola manufacturer's number as shown on the name plate:

No. 5 Cupola

1. Spray oil on soft wood before dropping down 25 to 30 pieces 1¼ x 1¼ x 24 in. Place in center of cupola.

2. Fill up to 2 in. below tuyeres after fire is well lit, with same size wood as in first batch.

3. When previous batch is well lit fill up to 20 in. above tuyeres with same size wood.

4. When smoke has almost disappeared and a clear flame shows, start adding 400 lb coke. After top of coke is red all over (approximately 30 minutes after first addition is made) add 400 lb more coke. When top of second batch is red all over add approximately 800 lb coke to proper bed height. That is approximately 42 in. above tuyeres. Spread 125 lb limestone on top of bed, then start first charge. Miscellaneous items: 1500 lb of iron in all charges; 52 lb limestone between charges; 225 lb coke between first three charges; 190 lb coke on next two charges; 180 lb coke on remaining charges. Start lighting 6 p.m.; start blast 8:05 p.m.; start tap 8:28 p.m.

No. 7 Cupola

1. Spray oil on soft wood before dropping down 30 to 35 pieces 1¼ x 1¼ x 24 in.

2. Fill up to 2 in. below tuyeres after fire is well lit, with same size wood as first batch.

3. When previous batch is well lit fill up to 20 in. above tuyeres with same size wood.

4. When smoke has almost disappeared and a clear flame shows, start adding 600 lb coke. After top of coke is red all over (approximately 30 minutes after first addition is made) add 600 lb more. When top of second batch is red all over add approximately 1200 lb coke to proper bed height. That is approximately 48 in. above tuyeres. Spread 140 lb limestone on top of bed, then start first charge. Miscellaneous items: 2000 lb of iron in all charges; 78 lb limestone between charges; 260 lb coke between first three charges; 240 lb coke on remaining charges. Start lighting 4:35—4:45 a.m.; start blast 6:40—6:50 a.m.; start tap 7:03—7:13 a.m.

No. 9 Cupola

1. Spray oil on soft wood before dropping down 40 pieces 1¼ x 1¼ x 24 in. Place in center of cupola.

2. Fill up to 2 in. below tuyeres after fire is well lit, with same size wood as first batch.

3. When previous batch is well lit fill up to 20 in. above tuyeres with 1¼ x 1¼ x 48 in. wood.

4. When smoke has almost disappeared and a clear flame show, start adding 1200 lb coke. After top of coke is red all over (approximately 30 minutes after first addition is made) add 800 lb more coke. When top of second batch is red all over add approximately 1600 lb coke to proper bed height. That is approximately 45 in. above tuyeres. Spread 150 lb limestone on top of bed, then start first charge. Miscellaneous: 4000 lb of iron in all charges; 156 lb limestone between charges; 480 lb coke between first three charges; 460 lb coke between remaining charges. Start lighting 4:35—4:45 a.m.; start blast 6:40—6:50 a.m.; start tap 7:03—7:13 a.m.

Skip hoists for the cupolas are included in the proposed expansion and rehabilitation program, but up to the present the cupolas are charged by hand. The charges are made up on buggies, weighed and then pushed over to whichever of the cupolas is in use. Charges are designed to absorb all the gates, sprues and shop scrap from the previous day's heat. The remainder is made up of 5 to 10 per cent steel scrap, pig iron and miscellaneous foreign scrap. Scrap in the yard is handled by a jib type crane equipped with a long boom. This crane also operates the drop ball for breaking the larger pieces of scrap to cupola charging size. Some of these pieces of scrap—for example, ingot molds from the steel mills—are almost as hard to break as the bombproof structures in the one time "thought-to-be-invincible" Maginot line.

Book Review

Metallurgy of Steel Castings, by Charles W. Briggs, cloth, 633 pages, 5¾ x 8¾ in., published by McGraw-Hill Book Co., New York. Price $6.50.

Filling a long-felt need in foundry literature, this new book on steel casting metallurgy is a valuable contribution since it brings together in one volume detailed information on technical and metallurgical control in producing quality steel castings. As the author points out, the language is such that it can be understood not only by the technical men, but also by operators, workers and apprentices in the industry; casting buyers; design engineers; metallurgists in other industries, and by students. This reviewer concurs in that viewpoint, and believes that it should be studied rather than made just an addition to the library.

The book is divided into 16 chapters covering specific phases of steel casting production from melting to final inspection and properties. The first two chapters, devoted to descriptions of basic and acid melting practices, provide detailed information on open-hearth, electric, and converter proceses and the reactions involved. Gases, deoxidation, porosity and inclusions are discussed thoroughly in chapter III, while procedures of tapping and pouring are described in chapter IV. In chapter V volume changes from the liquid state to atmospheric temperature and the fluidity

of steel receive attention, and in the following chapter the rate of solidification, contraction or shrinkage cavities, controlled directional solidification, chills and chaplets, and centrifugal castings are discussed in detail.

Some 30 pages in chapter VII are concerned with information on gating and risering, providing not only theoretical but also practical consideration. Contraction in the solid state, discussed in chapter VIII, deals with free and hindered contraction, stress concentration, cracks, etc. About 20 pages, comprising chapter IX, deals with hot tear formation externally and internally, and methods of prevention. Almost 60 pages are devoted to a description of molding sand and cores, including binders, atmospheric-temperature properties, molding practice, core oils, reclamation,etc. Effect of molten steel on sands, cores and washes is discussed in detail in the following chapter, while casting defects are reviewed in chapter XII. Cleaning, chipping and grinding of castings comprise the subject of chapter XIII.

Chapter XIV, containing 55 pages, discusses heat treatment and metallography, and describes the as-cast structure, those obtained by heat treatment and its modifications, and commercial procedures. Excellent information on welding steel castings is given in chapter XV, and the book is concluded with a chapter on inspection and properties. At the end of each chapter, the author has included extensive bibliographic references so that the reader may, if he so desires, study certain phases more extensively.

E. B

WHITE PAINT AIDS GOOD HOUSEKEEPING

(*Concluded from page* 109)

All overhead cranes were thoroughly washed down with kerosene to remove all grease and oil and then washed with paint thinner to leave a good clean surface, after which they were painted a chrome yellow with black lettered safety signs. These bright yellow cranes stand out against the white background, add to safety and tend to promote quicker movement.

All jib cranes were painted aluminum with chrome yellow stripes to make them outstanding both to the man on the floor and the operators in the overhead cranes who are continually carrying large heavy loads over the various jib crane areas. Sand handling and storage equipment is painted aluminum. A 6-ft dado is painted gray.

The overall result is a much brighter and cleaner appearing foundry atmosphere. Seldom is overhead lighting necessary during the daylight hours, because painting, plus adequate dust control, makes windows, skylights, reflectors and light bulbs stay cleaner longer. Light reflection from white paint is greater and the reflection level better and for a longer period.

Up-to-date washrooms in keeping with the generally cleaner foundry make the foundryman the best street-dressed group coming into or leaving the plant.

Any worker, and the foundry worker in particular, works better in clean and bright surroundings. White paint definitely helps make a good foundry a better place to work.

Simplify Band Saws

A simplified practice recommendation for hard-edge, flexible-back, metal-cutting band saws has been approved for promulgation, according to the Division of Simplified Practice, National Bureau of Standards, Washington 25. The recommendation designated as R214-45, was developed in co-operation with the industry and establishes a voluntary simplified list of regular type and skip-tooth metal band saws. Mimeographed copies are available free until printed copies can be made.

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TRANSITE CORE PLATES MADE OF ASBESTOS

ALUMINUM MELTING TEMPERATURE

(*Concluded from page* 91)

Bars were poured at each step down to 1250 F. This was carried on with 1500 F, 1400 F., 1300 F., etc. We then heated another furnace alternatively 50 F hotter and cooled the metal the range necessary to pour at 1250 F. The metal was heated to 1250 F. and poured; to 1300 F., cooled 50 F., and poured; to 1350 F., cooled 100 F., and poured; and so on until the metal reached 1700 F., cooled 450 F., and poured. The test bars then were pulled with a stress strain recorder. Yield values, tensile values, modulus values, proportional limit and elongation were determined. The bars were then subject to microphotographic examination. Results showed that the greater the degree of variance, the larger the grain size and the coarser the structure of the metal. Variation in grain size was just as pronounced as pouring at a temperature higher than necessary.

In bars poured when the metal was cooled 200 F., from 1450 F., down to 1250 F., pouring temperature had approximately the same grain size as the test bars poured at 1400 F. Decrease in tensile strength, while not exceedingly large, was reflected in the increase of variance between maximum and pouring temperature. Yield strength and elongation suffered noticeably. Modulus values decreased proportionately and general structure of the material became coarse. A series of castings was poured in the same manner for purpose of examining them under pressure.

The foregoing results again held true. This experimentation work plus the constant correlation of physical results obtained on heats produced, with the entire melting history of the heats recorded by recording instruments in the melting furnace as well as the pour-off stations definitely showed that the larger the variance between maximum temperature obtained and the pouring temperature of subject parts the worse the structure of the metal and the more difficult it was to obtain minimum physical requirements as per specifications.

Several other statements in chapter XVII may be contended. One is that the length of time the metal remains molten in the furnace is not a major factor. This definitely is very bad practice. Hydrogen absorption can take place at all times while the metal is in a molten condition. Also, metal held at high temperature will show very definite grain growth regardless of what temperature it is cooled to before pouring.

The statement also is made that aluminum can be poured at 1000 F., into very thick castings. I never have seen or heard of an aluminum alloy capable of being poured at this low temperature. The approximate melting temperature of aluminum alloys is 1075 to 1100 F.

A quotation from *Sidelight on Aluminum*, advocating vigorous stirring of aluminum immediately before pouring, seems to me definitely very bad practice. The least amount of agitation to which aluminum is subjected, the less chance of dross formation. Vigorously stirring aluminum before pouring creates oxides to a marked degree. These oxides enter the mold with the stream of metal and create casting defects.

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THE AJAX-Tama-Wyatt Low Frequency Induction Furnaces are now made in small sizes with capacities ranging from 20 to 35 kw.
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AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting

New Representative

Cleveland Quarries Co., Cleveland, has appointed Robbins Equipment Co., Chattanooga, Tenn., to handle the sale of its refractories in the state of Tennessee. The territory in the state of Illinois, north of Springfield, and Lake, Porter and La Porte counties, in Indiana, will be covered by representatives from the Cleveland office.

MALLEABLE INDUSTRY DEVELOPMENTS

(*Continued from page* 105)

tain castings has replaced the former gate core. In many cases, it has been necessary to use a gate core to produce sound castings, especially when the flange of the casting was less than ½-in. In the new method a gate pad eliminates the gate core, makes a better appearing casting by elimination of the core scar, replaces the difficult gate snagging with an easy shear operation and also saves some metal.

Some plants have substituted a new material for seacoal. This material is a hydrocarbon having an ash content of about 1/10 of 1 per cent. Seacoal analysis on our molding sand ran about 6 per cent by weight. Using the new bond the analysis ran 0.5-0.7 per cent by dissolving a sample of sand in a solution of 50 per cent carbon tetra-chloride and 50 per cent benzol. The analysis of the new bond is obtained by volatilizing this solution. We actually used about one-third as much of the new bond as we formerly used of seacoal. This large amount of material used compared to the analysis of the new bond which is left in the sand is due to the fact that it has a low melting point of 300 F and volatilizes at 1100 F.

Advantages Outweigh Cost

On a cost basis alone, one is not justified in using this bond. We believe that it does clean up the plant and on larger castings produces a better looking surface. Smaller castings also look better, but we have had some difficulty with a fin at the parting. This can be overcome by using a different pattern spray.

We have had to decrease our moisture 0.6 per cent over what we ran when using seacoal, with a corresponding increase in permeability of 15-20 points. This lower moisture content in the sand we believe is responsible for a reduction in our scrap losses. As you know, a lower moisture sand has more flowability and produces a better looking casting.

The old periodic ovens for heat treating the white iron castings gradually have been replaced by more up-to-date equipment. During the war the latest in malleable annealing furnaces was the bell shaped covers equipped with radiant tubes. The covers are practically gas tight and require no outside gas to maintain the proper atmosphere. The fuel consumption will run in the neighborhood of 3600-4200 cu ft of 1000 Btu natural gas per ton of castings annealed.

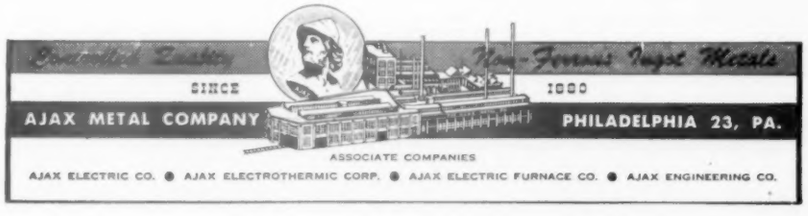
Electric ovens of the General Electric type with stationary electric elements in which the loaded car is raised and lowered, also have been installed in some plants recently. The heat treating is done in two steps. In the first oven the castings are brought to temperature and held for the proper length of time to complete the first stage of malleablization. The loaded car is then transferred to another oven and the slow cooling is carried out. This method consumes 450-500 kwh per ton of castings.

Radiant tube, atmosphere-controlled furnaces of the continuous type are used widely for large tonnage production, especially in the annealing of smaller castings. The fuel consumption is considerably lower in this method of annealing compared with batch annealing.

Trend in cleaning is toward the use of shotblast or centrifugal blasting. In many cases it is necessary to tumble for breaking off fins or rounding edges or for polishing castings. Some castings require both methods of cleaning, especially if it is necessary to shotblast to get the casting clean down in a pocket.

Years ago the only method of removing gates was to grind them. We shear many gates and prefer shearing over grinding whenever possible. More recently gates have been milled and broached. This has improved working conditions, because it is

Designers and foundrymen, charged with the gigantic responsibility of specifying engineering materials for the products of a world once again at peace, are closely scrutinizing the widest range of selectable materials ever offered to industry. Of primary importance is the direct consideration of Performance; and, decisions thus made must, of necessity today, be tempered with new emphasis on total Cost. An alloy, therefore, which measures high in strength, toughness and corrosion resistance—which has cut its eye-teeth long ago on marine castings and fittings, engine bases, pump bodies, gears, etc.—yet permits the foundryman to produce solid castings perfectly free from surface imperfections and which leave the sand bright and clean—and will take a mirror-like polish —an alloy like that deserves investigation. A metal of such calibre is Ajax High Tensile Manganese Bronze. Produced under rigid laboratory standards to constant formulae, this Ajax ingot has established recognition as the highest quality manganese bronze available. Write for complete data NOW.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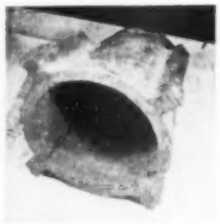
a less hazardous operation and has helped to eliminate scrap due to deep grinding.

The major problem in successful operation of a malleable casting plant is the economical handling of raw material and castings in process. The mechanizing of plants calls for increasing use of continuous conveyors in molding, sand handling, and conveying of castings from one department to the other. Castings in many plants are not manually lifted. They are lowered during the various operations.

Many of the smaller plants have gone to the use of small tractor yard cranes for unloading and handling material; utilizing electric or gasoline trucks to charge furnaces and handle material throughout the plant; installing molten metal handling equipment; employing gravity roll conveyors, and installing annealing pot handling equipment.

The casting industry does not appeal to the coming generation of young men. The question arises, "What can be done about it." The real answer is that we must provide plants with plenty of light and fresh air, clean floors, and freedom from excessive dust in the atmosphere. Men must have a place to clean up and bathe. What we need is a complete change in housekeeping. Marked progress along these lines has started and the casting industry will provide a place to work comparable to that in a modern machine shop.

Internal and External Hot Tears



(*Concluded from page* 87)

true meaning of the word, must be correctly identified so that the proper measures can be employed to eliminate them

External hot tears are formed when the contraction of the casting, during cooling, is restrained by stresses arising either from the mold or from the casting design. Internal hot tears are the result of inadequate feeding.

External hot tears are eliminated either by the judicious application of chills or brackets which strengthen the metal, making it capable of resisting the tearing stresses, or by using weak sand or relieving cavities which enable the mold to collapse, thereby relieving the stresses. Internal hot tears are eliminated by any of the means which are used to prevent shrinkage.

Severe external hot tears are easily seen on the surface of the casting. Slight tears may be overlooked in a cursory inspection but will be discovered when the casting is sandblasted, radiographed, or subjected to a magnetic powder test. The only reliable means of detecting internal tears is by radiography.

On a radiograph, the internal hot tear will show branches emanating from the main crack, while the external tear does not. External tears are roughly parallel to each other and do not cross, while the internal tears have no particular orientation.

An external hot tear will occur in a perfectly fed casting while an internal hot tear will not. Internal tears are found in the presence of shrinkage cavities or spongy, low density metal.

Note: The opinions expressed are those of the authors and do not necessarily reflect the views of the Navy Department.

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Book Review

Pay Day, by Ray Millholland; cloth, 240 pages 5¼ x 8 in.; published by William Morrow & Co., Inc., 425 Fourth Ave., New York 16, N. Y.; price $2.50

In this book, which bears every evidence of sincerity, thorough knowledge of the subject and a high degree of literary skill, the author drives straight to the heart of what is wrong between management and labor in this country. He is a realistic, tough minded engineer who served six years as an apprentice machinist, became a machine shop foreman and factory superintendent and owner of a factory. For two years he worked with the War Production Board on industrial relations. Without either fear or favor he condemns the sins of omission and commission either on the part of capital or labor. He is constructive in his suggestions as to how conflicting interests can be welded into a working partnership. His ideas will be endorsed by men who believe that intelligence, good faith and compromise can break the labor-management deadlock. They will be denounced violently by extremists in the camps of capital and labor.

The subject, timely and appropriate in the present era of strikes and more strikes, is presented under 19 chapter headings: "Pride of Craftsmanship," "Law of the Ceiling," "Man to Man," "Man and the Machine." "Piece Work or Straight Time," "Hired and Fired," "Who put over Unionism?" "Plant Rules and Discipline," "Horizontal and Vertical Unions," "Closed or Open Shop," "Union Leadership and Discipline," "What's the Job Worth," "Suggestions and Suggestion Systems," "Job Security," "The Labor-Management Committee," "Disputes and Grievances," "Human Structural Engineering," "Women in Industry," "Opportunity."

American Cast Iron Pipe Research

(*Continued from page* 99)

6-in. dameters was placed in operation. In 1926 a production unit for making 3 to 12-in. diameter pine in 16-ft lengths was started and by the end of 1927 it was operated three 8-hr shifts. By 1930 pipe up to 24-in. diameter was being produced centrifugally; in 1935 the size was increased to 36-in., and in 1939 up to 48-in. diameter. All pipe now produced at Acipco is produced in 16-ft lengths by the centrifugal process in sand-lined molds.

With its long experience in the centrifugal casting of cast iron pressure pipe, it was not surprising that the firm was called upon early in 1940 to aid in overcoming the lack of forged steel capacity by producing certain types of steel castings centrifugally. In a relatively short time the necessary procedures were worked out, and included the manufacture of centrifugally cast steel, radial engine cylinder barrels, aircraft landing gear parts and steel tubes in 16-ft lengths for hollow ship shafting and numerous other purposes. Production of steel tubes was expanded to include diameters from 3 to 50-in. in 16-ft lengths of carbon steel and also in 18-8 stainless, and other heat and corrosion resisting chrome-nickel steel alloys. In 1941 the company carried on experimental work and then perfected a method for making cast iron shells or projectiles in permanent or metal molds.

Present research activities are directed by W. D. Moore, the president of the firm, and Richard R. Deas, works manager, with a committee composed of the heads of various departments including chemical, metallurgical, foundry, melting, pipe plants, engineering and mechanical. The committee meets from time to time to review the status of the

work under way, and to propose new undertakings as well as to determine the sequence of starting suggested research projects. Naturally those of most importance are highest on the agenda, but in some cases problems arise which require immediate attention, and work on those is begun at once.

Research staff centers around a nucleus of 15 men whose services are amplified with those of others as the need demands. Close co-operation between facilities of various departments is maintained, since it is not unusual for solution of a foundry problem, for example, to require service from the chemical, metallurgical, melting and engineering departments.

Members of the research staff well known to the foundry industry for their technical papers on a wide range of subjects include Dr. James T. Mackenzie, James A. Bowers, Charles K. Donoho and S. D. Moxley. Broad field covered by their investigations, as presented in the technical press, embrace such topics as impact resistance of cast iron; influence of phosphorus; overcoming cupola spout trouble; effect of coke size on cupola iron; comparison of cupola refractories; cupola linings; effect of size on cupola iron; comparison of cupola refractories; cupola linings; effect of blast pressure; factors in mechanism of testing; carbon and sulphur in the cupola; effect of tuyere height on carbon pickup; centrifugal casting of cast iron and steel tubes or pipes; standard test bars for cast iron pipe; etc.

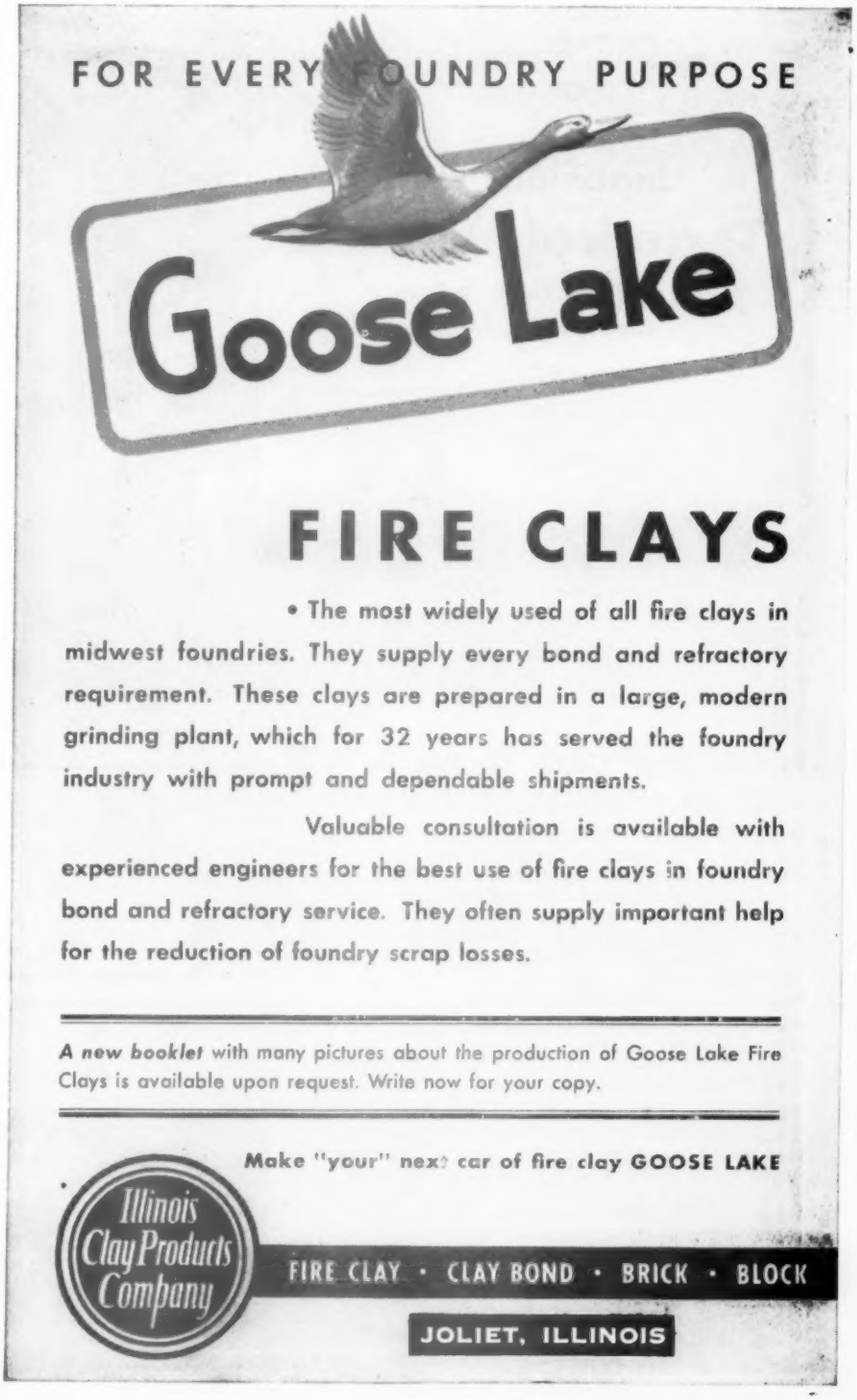
Equipment Available for Testing

Facilities for conducting testing and research at American Cast Iron Pipe Co. cover a wide range of regular and special equipment. A well equipped and staffed chemical laboratory is available for complete analyses of iron and steel products and allied materials such as ferroalloys, slags, cokes, sands, clays, refractories, etc. A spectrographic laboratory is equipped for rapidly and accurately determining small percentages and traces of elements not usually ascertained chemically, as well as for checking routine chemical analyses. The physical testing laboratory contains equipment for carrying on hardness tests, tensile and compression strength determinations, bending tests, impact tests, etc.

Equipment includes a testing machine of 200,000 lb capacity for beam tests up to 15 ft span; two universal testing machines of 200,000 and 60,000 lb capacity; a combination Izod and Charpy impact testing machine; various types of hardness testers, and miscellaneous smaller machines adaptable to a variety of testing purposes. Complete equipment for metallographic examination is maintained, as well as a complete photographic laboratory. Polishing and specimen preparation equipment, metallurgical microscope, and low power photography are available for macro and micro photography, grain size determinations and special problems.

Both wet and dry magnetic particle inspection equipment is available in range sufficient to handle parts or structure of any usual size or shape. Radiographic examination is made with exposure to a 200-mg radium capsule which permits wide flexibility. Other equipment includes laboratory heat treating equipment with automatically controlled hardening and tempering furnaces; pressure testing equipment, including pumps, gages and gage testing apparatus; experimental melting furnaces for trial heats, including a 30-lb capacity electric induction furnace, a 21-in. diameter cupola and a crucible furnace. An important and valuable adjunct is the firm's technical library which contains over 2000 bound volumes of leading technical publications and books.

Investigation of corrosion problems in connection with cast iron pipe and fittings is carried on continuously at American Cast Iron Pipe Co. in both simu-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FIRE CLAYS
• The most widely used of all fire clays in midwest foundries. They supply every bond and refractory requirement. These clays are prepared in a large, modern grinding plant, which for 32 years has served the foundry industry with prompt and dependable shipments.
Valuable consultation is available with experienced engineers for the best use of fire clays in foundry bond and refractory service. They often supply important help for the reduction of foundry scrap losses.
A new booklet with many pictures about the production of Goose Lake Fire Clays is available upon request. Write now for your copy.
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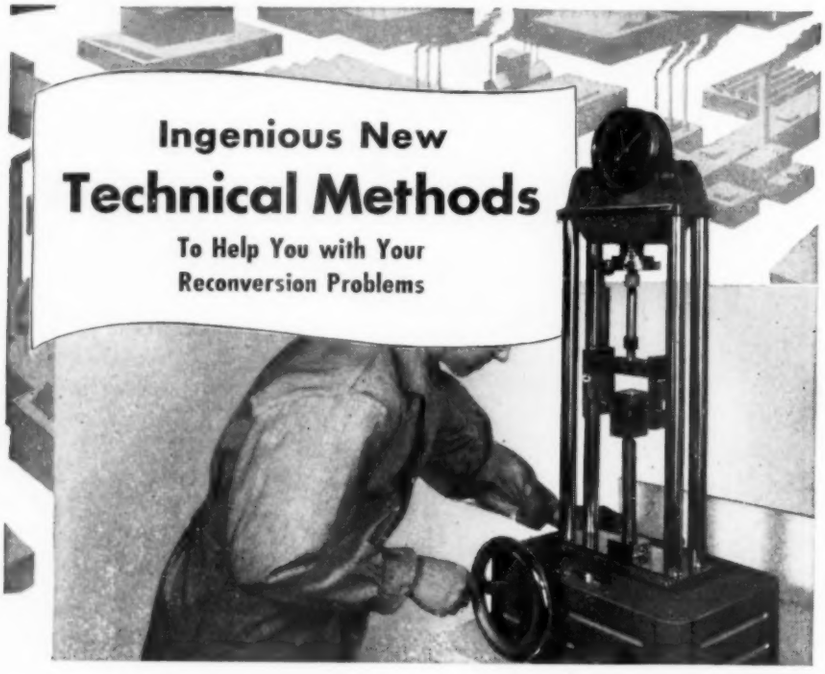
lated and actual service tests. The former includes specimens immersed in still and moving waters of different types and in spray testing equipment. In actual service tests sections of pipe are buried in pits containing different types of soil, cinders, etc., and left for varying periods of time. In addition to those pits located at the plant others are maintained in various sections of the country, and pipe sections buried there are removed and examined at regular intervals.

Prompted by the desire to render a public service the American Cast Iron Pipe Co. recently made available to its friends and neighbors its extensive scientific and research facilities. In offering these facilities it is not the company's intention to enter into competition with existing commercial laboratories or to undertake work in fields where adequate facilities already are available. Rather its efforts will be devoted to specialized research problems to which the ability of the research staff and equipment available are particularly fitted.

Scovill Mfg. Co., 99 Mill St., Waterbury, Conn., plans construction of a foundry, to cost approximately $650,000.



Portable Tester Checks Tensions Up To 10,000 lbs.— Right at the Workbench!

Standing only 37" high, weighing but 137 lbs., the Dillon Universal Tester checks wire, copper, aluminum, fabrics, steel, etc. for tensile, transverse, compression and shear strengths. Available in 7 capacities, with interchangeable dynamometers, the Universal will test from 0 to 10,000 lbs. Special gripping jaws are made for every requirement.

The Universal Tester may be either hand or motor operated. No special training is needed to record accurate results instantly on the dynamometer. It is compact, simple, inexpensive—designed for small shops and plants everywhere.

Tests prove that workers, too, undergo strain and nervous tension on the job. That's why many factories urge workers to chew gum. Workers can chew Wrigley's Spearmint Gum right on the job—even when hands are busy. And the act of chewing helps relieve monotony—helps keep workers alert, thus aiding them to do a better job with greater ease and safety.

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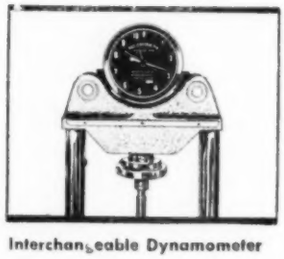

Interchangeable Dynamometer

AA-78

Publishes Industry Wage Study Data

Bulletins embodying results of nationwide surveys of wages and related working conditions in important industries, including the foundry industry, made by U. S. Department of Labor in connection with its Industry Wage Study program, have been released by the Bureau of Labor Statistics, Washington. Series 1, No. 1, Occupational Wage Relationships, Machinery Industry, provides measures of prevailing wage relationships among key occupations in terms of indexes constructed from wage data to show the spread between wages of various key occupations and wages of an unskilled occupation.

Series 2, No. 1, Wage Structure, Machinery, is devoted to an analysis of the various elements that influence variations in wages, such as region, size of establishment or community, incentive methods of pay and occupational composition. Appendix A, Industry Wage Study, Metalworking, contains job descriptions to assist in classifying workers employed under a variety of pay-roll titles and different work arrangements, into appropriate occupations to permit grouping of occupational wage rates representing comparable job content. Copies of the bulletins are available without cost.

Book Review

Evaluation of Effects of Torsional Vibration, 578 pages, 8½ x 11 inches, published by the Society of Automotive Engineers, New York. Price $10.

This report, prepared in response to a request from the Navy, presents the experimental and anlytical methods used by research departments of a number of leading diesel engine makers for investigation and applying means for controlling torsional vibrations. Engineers, designers and reasearch engineers interested in torsional vibrations will find it a valuable fundamental treatise on the subject.

The introduction sets the problems and the conclusions, while the remainder of the book consists of technical papers which discuss experimental methods used in measuring torsional vibration methods for determining the significance of nominal torsional stresses and means for reducing these stresses. Characteristics of well-known and conventional torsional vibration measuring equipment are described and compared. Attention also is given to various short-cut methods that have been found usable for calculating natural frequencies and for rapidly determining those experimntally by use of electrical and mechanical analogies.

Production Clinic Outlined

Recognizing that production is the present day problem of industry and that without its increase recent advances in business costs cannot be met, National Founders Association has developed suggestions for a production clinic, as a solution to production problems. The outline incorporates proven methods and new angles to assist management in setting up programs for increasing production efficiency in individual plants.

The material, for presentation to foremen and supervisors, covers foremen's responsibility, importance of good tools, machinery placement, maintenance, employee training, supervision, institutional features, wages, industrial relations and importance of co-operation.

The suggestions, which include 24 pages of ideas for increasing production efficiency, have been sent to members of the association, who have been urged to solicit further assistance of special nature covering individual problems, from the general office in Chicago.

Issues Apprentice Training Guide

Apprentice - Training Service, U. S. Department of Labor, Washington 25, has issued a 30-page booklet entitled, "Setting Up an Apprenticeship Program—A Guide to Employers in Training Veterans for the Skilled Trades," in answer to the growing demand for a comprehensive explanation of how to establish an apprenticeship program and procedures under the "G. I. Bill" when employing veterans as apprentices.

The booklet explains how to determine the various provisions to include in the training program and the steps necessary to obtain approval as qualified training institutions for veterans. A complete list of state agencies designated by governors to approve business establishments and educational institutions is given, and a formula on how to allocate training time to the various work processes of a trade. It also provides suggestions on wage rates for apprentices, on securing co-operation of employees, and on procedure to determine appropriate credit on terms of apprenticeship for previous experience. Copies of the booklet are available upon request.

Kaufman Bros. Brass & Aluminum Foundry is the firm name under which Carl Kaufman and Walter H. Kaufman have established their own business at 9501 South Alameda St., Los Angeles.

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EY-BAR is a scientifically designed casting of a metallurgical grade of aluminum. EY-BARS come in various grades, and their proportions are such that they will melt evenly and quickly, regardless of size. Made with standard tapered holes, they can be wedged on the end of a long steel bar and immersed in the melt in furnace, ladle or stream. They enable the furnace man to control exactly the amount of *effective* aluminum he wishes to add to his melt. They come in any size from 1 to 30 lbs, and from Grade I to Grade IV.

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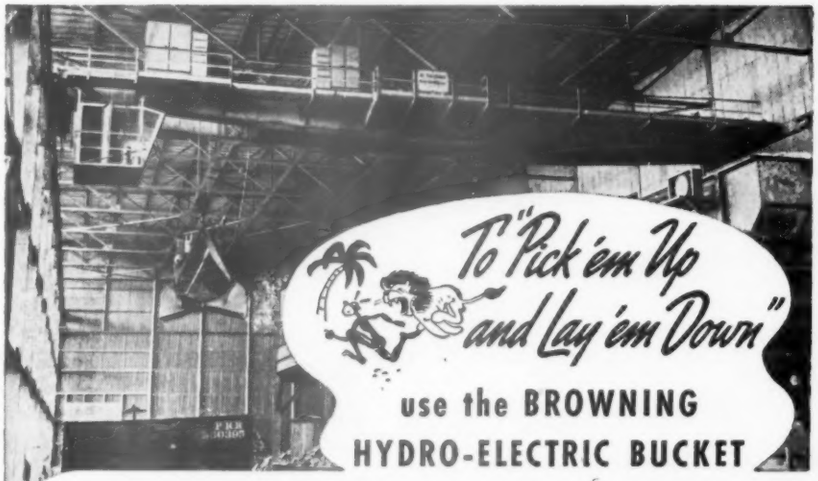

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READERS' COMMENT • • •

Melt Bronze in Cupola

To The Editors:

I have been a reader of The Foundry for a good many years and always feel sorry for the fellow who has trouble with his work. We all seem to get stuck some time or other. I started at the game before the turn of the century and have had my share of these experiences. Sometimes I wonder what has become of the old-fashioned molder who could take any job, a pulley, or gear or 90 degree elbow, and did not have to have it mounted on a matchboard or molding machine. All you hear now is molding machines and core blowers.

Like many of the old timers I came up through the days of molasses water for the cores. Sometimes sour beer was blown over the face of the core or mold. The beer was not always sour and in many instances the mold only got the benefit of the molder's breath. We did not have all the patented binders.

What prompted this letter was an article in the January issue of The Foundry mentioning among other things that through the demands of the late war, foundrymen discovered they could melt bronze in the cupola. Shortly after I had taken charge of the Western Iron Works foundry in 1916, the stress of war brought demand for bronze castings in excess of our melting capacity in crucibles. I built a special cupola which I hoped would melt bronze satisfactorily. The stack was 10 ft high and lined to an inside diameter of 24 in. A small stack projected through a hole in the roof and was anchored 6 ft above the furnace. A smaller stack or sleeve with a circular cone-shaped hood was arranged to slide up and down. When the cupola is lighted the inside stack and hood are dropped down to cover the open top of the cupola and carry off the smoke. The device is pulled up with two small cables and a counterweight while the attendant is throwing metal and fuel through the open top of the cupola.

We have made hundreds of tons of phosphor bronze to the exacting specifications of the Anaconda Copper Mining Co., and this metal had to be right for service in plunger pumps that raise the water 4800 ft. This water is so heavily impregnated it will eat up mine rails or any other iron or steel articles with which it comes in contact. They use wood lined pipes and bronze tees and elbows and copper nails.

Our special mixture contains copper, tin, phosphor-tin and lead. With a 2 per cent lead content the metal machines readily and the chips break off like cast iron. Through experiment I discovered that a better metal results from the use of 30 per cent returns in the form of gates and risers. Several years ago I read in The Foundry that the American Brass Co. followed the same practice. A low pressure blast is employed in the cupola. The metal is tapped into a heated ladle up to a gage and the alloy is added.

I hope you will not be too critical of this letter, but when I read the article on melting bronze in a cupola, I could not help but think there is nothing new under the sun. We have been melting bronze in the cupola for over 30 years.

William E. Thirloway,
President

Western Iron Works
Butte, Mont.

Discounts Drop Bottom

To The Editors:

Over a period of many years I have read a wide variety of articles in The Foundry, some touching on phases of foundry practice similar to those in this country, and with which I am familiar. Others describing methods and equipment which I never have seen, but which appeal to me through their obvious cleverness and applicability. One of the most remarkable dealt with the production of 60 in., diameter marine engine cylinders in the foundry of the Cooper-Bessemer Corp., Mt. Vernon, O., a few years ago. The cheek of the mold was split vertically through the center. What a bold idea!

Even though at times my faith is slightly strained, I am willing to accept all the statements in this highly reliable publication. I regret to say that my faith is not shared universally. I showed the *Hiroshimo* picture on page 130, Nov., 1945 issue; you know, the picture illustrating some of the destruction wrought in a Japanese city. I showed this to my chief, a prominent and well informed citizen. He would not accept it as genuine. Referred to it impatiently as just a characteristic bit of American extravaganza and dismissed it lightly as something "probably done with mirrors!" I don't think the few survivors in Nagasaki saw many traces of a mirror.

We had tough experiences here during the war. Night after night enemy planes flew over to bomb a neighboring city which had no anti-aircraft guns. Just like shooting a sitting duck.

During the war I had to make castings with test bar minimum tensile 18 long tons on ⅞-in., bar British Standard. I selected pig iron from an old type blast furnace, used it straight and a lot of the bars pulled 22 tons.

For years I had badgered my firm about having a smaller cupola for the light heats that were plentiful enough in the lean years. Following an absence of some time while the doctors gave me an overhauling in a medical drydock, I went down to the shop and found a small, new cupola ready for operation, and with all the cupola crew off sick. I had to use raw help, and to further complicate the situation I never before in a long foundry career, had operated a drop bottom cupola.

Believe me I was tired that night. The melt was only 3 tons, but the shop was filled with light, thin stuff which had to be right, just as important as any other job. Nothing went wrong and that was a great satisfaction. Despite the fact that there are no solid bottom cupolas in the United States, I can't say that I see any advantage. I am entirely without prejudice and am willing to admit that the work is easier at the finish of the blow.

You probably have read about the food shortage. Very limited at Christmas time. No turkey, no beer, no drinks of any kind. And I did not feel inclined to stand in a queue for my share. By the way do you know what a queue is? (Note by Ed.: Are you kiddin?)

Old Time Foundryman

Suggests Better Answer

To The Editors:

I read with interest your department entitled "Questions and Answers." As a general rule I find them instructive and informative. However, when I turn to page 118 of the December issue to read, "Aluminum Castings Have Defective Areas," I blush! Surely, sir, your answer does not give a direct reply to the question, further, the answer could give rise to considerable trouble in the form of entrapped oxide (Al_2O_3) and hydrogen gas occlusion if your advice were followed.

May I suggest that the question could have been answered rather more to the point in the following manner:

Yes, you can increase the flowability of your aluminum alloy by adding a few per cent of silicon. This may be added in the form of a 50-50 or 75-25 aluminum-silicon hardener. This is, of course,

assuming that the chemical composition of the resultant castings is not required to conform to a definite specification.

The addition of silicon to any aluminum base alloy increases the flowability of the material, since the percentage of eutectics is considerably increased and therefore the freezing range (or distance between the liquidus and solidus lines on the inverse rate cooling curve) is considerably extended.

It is pointed out, however, that the addition of silicon will only assist in the running of very light sections; your defective castings on account of misruns and cold shuts can be divided into two separate types of defect and should be treated individually.

1. Misruns:—May be accounted for by inadequate venting; this applies to castings fabricated either as permanent mold or sand castings. Misruns may also be accounted for by low metal temperature, and aluminum alloy containing 5-10 per cent Si fabricated either as a permanent mold or sand casting—however thin the sections—should run satisfactorily and produce fully run castings at temperatures between 1328 F and 1364 F.

2. Cold shuts:—May be accounted for by the gating and running system and also by utilizing too low a metal temperature.

Every endeavor should be made to produce a gating and running system so that the pouring stream does not get split up. Here again a metal temperature of 1328-1364 F should prove advantageous.

Bottom pouring, with a suitable dross trap at the base of the runner inlet, will assist on producing a casting free from trapped oxide.

I think, sir, that such an answer, if I may say so, would prove far more helpful to your correspondent. Your suggestion that standard practice is to use hot metal and rapid pouring makes me shudder. Would it not be far better to classify a maximum casting temperature, by this means you would be assured that your correspondent would not run 'head long' into trouble form gas 'pick up.' As to rapid pouring as a possible method of overcoming cold shuts and misruns, are not the troubles associated with rapid pouring, such as entrapped oxide induced through turbulence, likely to prove more dangerous than a misrun casting? Castings can be visually inspected for surface defects such as misruns and cold shuts; it is not every foundry that is equipped with nondestructive testing equipment as x-ray or supersonic apparatus, or are our American friends operating in realms that are still but dreams in the large majority of foundries in old England?

SIDNEY B. DEW,
Chief Metallurgist

Light Alloy Division
Wellworthy Piston Rings Ltd.
Lymington Hants, England

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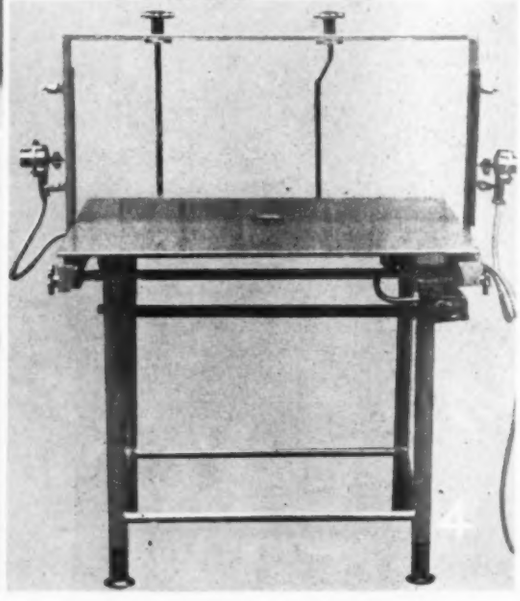
New EQUIPMENT and SUPPLIES

(1)—Blade Lubricant: Monogram Mfg. Co., Los Angeles, has developed a new dry lubricant which is said to prolong greatly the life of drills and band saw blades. It is compounded of turpentine, mineral oil, paraffin and other materials. The lubricant is applied in either ½ or 1-in. sizes through a square metal holder which is attached to the band saw guard. A slot guides a small weight resting on top of the stick of lubricant, which passes between the saw teeth to the inside surface and assures adequate lubricant on both sides. In addition to the square sticks the lubricant is available in package form for manual uses.

(2)—Centrifugal Machine: Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, is offering a line of centrifugal casting machines which are controlled and operated entirely by hydraulic power. The power unit, which provides a smooth stepless variation in table rotation speed, is installed separately from the machine, requiring only a piping connection. Any number of machines can be operated from one power unit. The operating stand has only a single control for starting, braking, stopping and reversing. All wearing parts are completely enclosed and immersed in oil, providing protection from foreign matter and making lubrication unnecessary. Models available have table diameters ranging from 18 to 36 in. and accommodating molds weighing from 300 to 1500 lb, with maximum metal and mold load varying from 600 to 3000 lb.

(3)—Sand Conditioner: Beardsley & Piper Co., 2540 North Keeler Ave., Chicago, 39, announces a new and improved portable model of its Screenarator for cleaning, cutting, aerating and blending foundry sand. New features include a motor of more rugged but simpler design. The main frame also has been simplified, and a brace from the frame locks the wheels to eliminate movement of the machine while in operation. The handle now is retractable and located so the machine can be moved more readily. Pneumatic tires assist the unit's portability. Conditioned sand may be discharged as far as 25 ft and elevated from 2 to 10 ft depending on the operator's requirements.

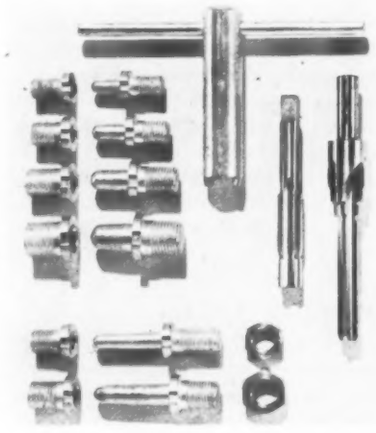
(4)—Core Machine: Newaygo Engineering Co., Newaygo, Mich., is offering a new machine which is said to effect cost savings of up to 50 per cent compared with hand-draw methods in making small cores. The unit, known as the Rappless core machine, allows drawing of any angle box by a quick adjustment of a hand wheel. Equipped with



vibrators at each end, the machine is adapted to one or two-man operation. Cores move through the machine continuously, eliminating setting off of plates at the side. No special pins or grooved plates are needed. Floor space required is 36 x 40 in.

Universal Joint: Brooks Equipment Corp., 217 Hudson St., Hoboken, N. J., offers a new symmetrically designed steel universal joint, precision ground, which adds greater strength and even distribution of wear for pins and blocks. A special feature provides a positive lock for the pins and convenient method of disassembly. Joints are rustproofed and individually packaged.

Metal Dowel: Kindt - Collins Co., 12651 Elmwood Ave., Cleveland 11, announces an improved type of steel dowel, hardened and cadmium-plated, for metal patterns and coreboxes, which develops economy and efficiency in



foundry work. Easily inserted, a new type shoulder and taper fit of body keep dowel anchored tight. New type wrench of hardened steel permits firm tightening of dowels, preventing stripping. Dowels are available in four standard sizes, two of which have extra long pins which can be fitted with nuts for permanent installation. Only four tools are required to apply the dowels, including drill, combination counterbore and reamer, tap and wrench.

Air Gun: Air-Way & Equipment Co., 40 South Jefferson St., Chicago 7, offers a new feature which has been added to its streamlined air gun with ball and socket joint connecting an internal lever to the valve. A screw-on ferrule for convenient, direct attachment to the air hose without use of special tools, slips over end of hose. Threaded shank of the air gun is inserted in hose and engaged with threads in ferrule. Screwing up tight

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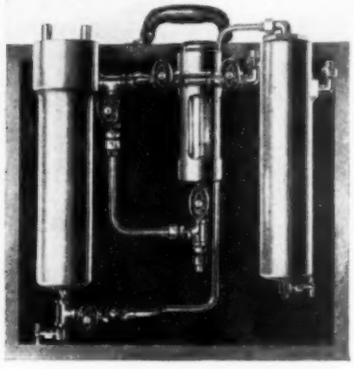
compresses hose in a vise-like double grip between serrations of ferrule and threads on air gun shank. Only wrenches are required, and installation is conveniently made any place in the plant.

Dehydrator Unit: Russell R. Gannon Co., 775 Gwynne Bldg., Cincinnati 2, has developed a dehydrator unit for control of moisture content, relative humidity and dew point of air and other gases. The unit is portable and is capable of dehydrating compressed air lines with pressure up to 2000 psi. Dehydrating chemicals may be replaced at slight cost. Unit can be equipped with precision-tested dew point color change indicator which insures accuracy of working conditions.

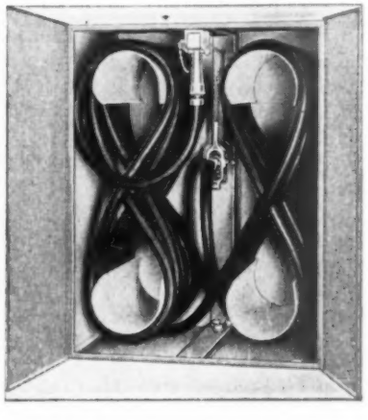


Abrasive Disks: New York Grinding Wheel Corp., 623 Bergen St., Brooklyn, N. Y., has developed an improved type of abrasive metal-finishing disk for portable sanding units. A tough resilient rubber compound bonds abrasive particles together to form a bonded cutting layer of grit, ⅛-in. thick. The second layer is a cloth of high tensile strength, the third a several-ply tough fibre material. The three layers are held together by a tough resilient cement. The disk is available with leading edge elevated, to provide a thicker layer of cutting material at point of maximum wear, or with grits on both sides for grinding in slots and grooves. Where sanding units are not portable, disks with a plain cloth back for cementing on stationary sanders can be supplied. They are manufactured in any diameter up to and including 18 in., with any desired bore, with standard thickness of 5/32-in.

X-ray Unit: North American Philips Co. Inc., 100 East 42nd St., New York 17, announces a new chest survey x-ray unit capable of handling chest examinations at a rate of 200 to 300 per hour. The unit, designed for quick assembly and disassembly, consists of x-ray tube and power supply, fluoroscopic screen, automatic 70 mm. camera, and control stand. In operation, the image on fluoroscopic screen is photographed in miniature size on a roll of film which accommodates 350 exposures. No component of the mechanical assembly weighs more than 80 lb. No tools are required for setting up equipment.

Electric Furnace: Cooley Electric Mfg. Corp., Indianapolis, has added two new optional features to its muffle type electric heat treating furnaces. Standard furnaces are equipped with a hinged door which forms a loading shelf when opened. Where only partial door opening is required a counterweighted vertically operated door is now offered. A heavy gage structural stand of welded construction is a second new feature. It serves as a bench for the furnace and provides a shelf for storage space beneath the ample table top area which establishes furnace at proper working height with furnace hearth 42 in. above floor. For heat treating tools, dies and small parts, laboratory testing, drawing, tempering, annealing, etc., the furnaces are available in two standard sizes, with chamber dimensions 8 x 6 x 14 in. and 10 x 6 x 18 in., for continuous operation at 1750 F or intermittent operation at 1850 F. Heating time to 1400 F is approximately 40 min., to 1850 F approximately 55 to 65 min.

Fog Fire Fighter: Bowser Inc., Fort Wayne, Ind., announces a new fog fire fighting unit which may be connected directly to any water line. A valve actuating fixture holds the fog nozzle for instant use and fog appears at nozzle within four seconds after nozzle is removed from cabinet fixture. The units are available in two models, one with 100 ft of 1-in. hose, and another with shorter hose and smaller cabinet. Fog nozzle throws up a protecting wall in front of operator, shielding

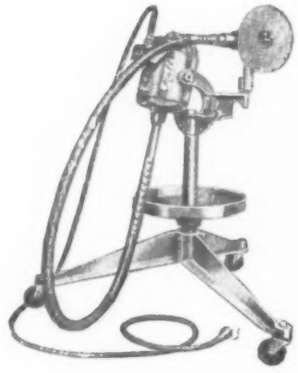


him from intense heat of blaze. Fog dilutes vapor and washes air behind nozzle so that operator may safely enter a gas or smoke-filled area. Units are also equipped with standard solid stream nozzle to provide protection where flame is impossible to reach with fog.

Tool Holder: Industrial Tool Division, Cooper-Bessemer Corp., Mount Vernon, O., announces a new line of drop-forged lathe turning and cut-off tool holders, embodying a patented feature for holding cutting bit rigidly in place. Forged from a special analysis

steel which supplies maximum strength and resistance, the tool holders are equipped with clamping pin which engages the bit for nearly its entire length. Two flush-type set screws lock tool bit into position, preventing slipping, as shown by the accompanying phantom view. Dowel holds clamping pin in position for inserting cutting tool and prevents pin from falling out when bit is removed. Dowel is easily removed to permit taking clamping pin out when necessary.

Grinder: Mall Tool Co., 7720 South Chicago Ave., Chicago 19, has added a new flexible shaft grinder to its line of grinding machines. New model has a ¾-hp motor, designed for operation on 110/220 v single phase ac. An



extensive selection of spindles and attachments make grinder available for grinding, disc sanding, polishing, wire brushing and drilling. Pedestal type mounting provides for motor tilting and swiveling. Large casters make for easy portability.

★HANDY? You bet!

In your foundry, a time and work saver.

Handy for repairing surface defects—dries faster, sets harder. Try it!

Shelton Metallic Filler

Send for a liberal sample

PRODUCT OF

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Practical

SEMET-SOLVAY metallurgists are practical foundrymen who are always glad to help with your melting problems. Their services go along with the use of Semet-Solvay Foundry Coke.

SEMET-SOLVAY COMPANY

BUHL BUILDING, Detroit 26, Mich. — GENESEE BUILDING, Buffalo 2, N. Y.

DIXIE TERMINAL BUILDING, Cincinnati 2, Ohio

Canadian Sales Agent: Standard Fuel Co., Ltd., Toronto

Semet-Solvay Foundry Coke

for Better Melting

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FIGHT Foundry DUST

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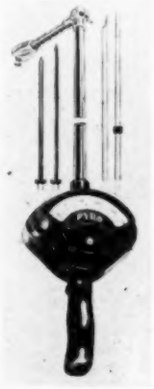
SPRINGFIELD · OHIO

Pyrometer: Pyrometer Instrument Co., 106 Lafayette St., New York 13, has developed a new immersion pyrometer with several types of instantly interchangeable thermocouples. Especially designed for the nonferrous industry, the instrument has a large 4¾-in. indicator with a 4-in. direct reading scale calibrated from 0-1500 F or equivalent centigrade.



Two models with overall lengths or 27 in. and 43 in. are available, both having a specially designed swivel 8 in. from connector block which permits use of pyrometer at any angle. Swivel is equipped with toothed notches preventing it from becoming loose during operation. The instrument can be used with bare metal or protected type thermocouples. Thermoelectric system is constructed with permanent magnet, low resistance type galvanometer, has an internal automatic cold end compensator in addition to external adjusting screw and is enclosed in shock, moisture, and dust-proofed steel case, which gives full protection from magnetic surroundings.

Rectifier: Mellaphone Corp., Rochester 2, N. Y., offers a new line of rectifiers, designed to convert alternating into direct current for energizing such equipment as magnetic separators and lifting magnets in foundry use. Rectifiers have tubes mounted outside main housing and protected by perforated metal grill, insuring proper ventilation and freedom from arc-backs under full load. Heavy duty mercury vapor tubes provide high efficiency, good voltage regulation and long life.

Protective Coating: Geo. R. Mowat Co., 24 West 40th St., New York 18, has developed a coating that is said to bond firmly to metal, wood or cementitious surfaces, to have high ductility and elasticity, to be fume resisting, waterproof, acid and alkali protective, and to set with or without the necessity of heat. The coating, which gives a clear, hard finish to metal and wood, seals against moisture and prevents absorption of liquids, and prevents rust and corrosion on steel and iron. It is available in one and five-gal cans and 50-gal drums.

Finger Cots: American Optical Co., Southbridge, Mass., announces two scientifically designed finger cots which provide rugged protection for both front and back of fingers. One of the cots, made from selected grain leather, is useful for soldering small wire assembly work, etc. The second design, made from high grade chrome tanned cowhide leather, is recommended for polishing, burring, grinding small parts, etc. An elastic strap in back at the bottom permits complete freedom of movement, insures the cots staying in place and makes them easy to put on and remove. They are available in small, medium and large sizes.

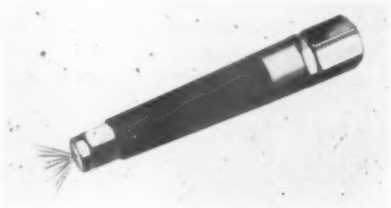
Arbor: Paxson Co., Dowagiac, Mich., announces an arbor unit which may be mounted for grinding, polishing, buffing, sanding or abrasive discs, nonferrous metal cutting or for power transmission or idler pulley use. Shaft is 1½ in. between bearings, precision built and balanced to eliminate spring and vibration. Ball bearings are fully enclosed in dust-proof gray iron housings to exclude dirt. Belt pulley is keyed to shaft with set screw lock. Arbor shaft is furnished either 1 in. or 1⅛ in. between collars where tools are mounted.

Recorder: Bacharach Industrial Co., 7000 Bennett St., Pittsburgh 8, is producing a portable automatic recorder for room and atmosphere temperatures, interchangeable for electrical operations. Charts obtained with the

temperature recorder show highest and lowest temperature during test period, duration of any temperature extreme, and spread and frequency of temperature variation, while those obtained with operation recorder show starting

and stopping time of motor, intervals of cycling, and record of running time. Recorder can be converted to any temperature range, or used as an operation recorder by changing door of instrument. Bi-metallic temperature elements of temperature recorders is located in front of door to assure maximum sensitivity to quick temperature changes. Operation recorder can be hooked into power line, or connected in parallel with load. Temperature recorder is available in standard time-temperature ranges.

Spray Valve: Lonn Mfg. Co. Inc., East New York St., Indianapolis, announces a nozzle spray valve unit



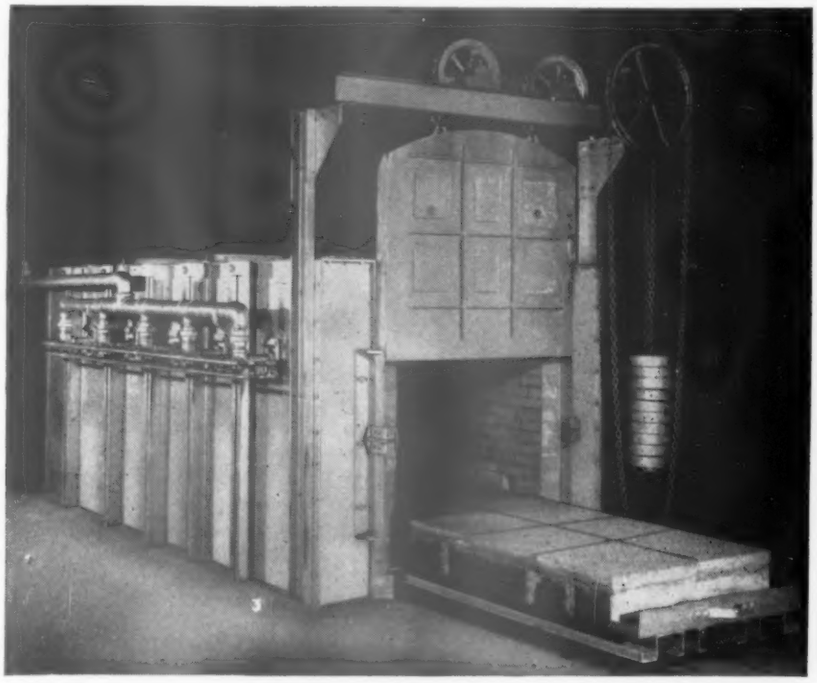
especially adapted to foundry use when a fine spray or water mist is desired. Slight pressure on flexible nozzle opens valve and permits liquid to emerge as spray. When pressure on nozzle ceases, spray automatically stops. Supplied with connections for either ¼ or ⅜ in. pipe, the unit gives fingertip control without adjustment.

Safety Goggle: Watchemoket Optical Co. Inc., Providence 3, R. I., announces an improved all-plastic safety goggle, made with a molded plastic frame that resists breakage, wears longer and provides better ventilation than previous

models, and reduces fogging. It may be worn directly over many styles of prescription glasses. The tough, methacrylate lens stops flying chips, splinters, splatters of hot metal, and exceeds federal specifications for impact-resisting goggles.

CARBOTTOM FURNACE particularly adapted to handling large castings. As designed by Bellevue engineers highly efficient and economical and subject to very accurate temperature control with automatic proportioning burner equipment. In comparatively small model shown, miscellaneous castings and forgings are heat treated. . . . Car type furnace can be had in various designs . . . over firing . . . under firing . . . recirculating type method.

Bellevue INDUSTRIAL FURNACE COMPANY
2971 BELLEVUE DETROIT 7, MICH.



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MEANS
FUTURE ECONOMY!

The modernity of design and layout of your plant or expansion project will definitely be a determining factor in the success of your enterprise. We have devoted nearly a quarter-century to solving the many and varied problems associated with design, construction and operation of modern foundries. Our highly trained staff of engineers is always at your service and ready to assist you with any design or construction problems you may encounter. Write or telephone us today!

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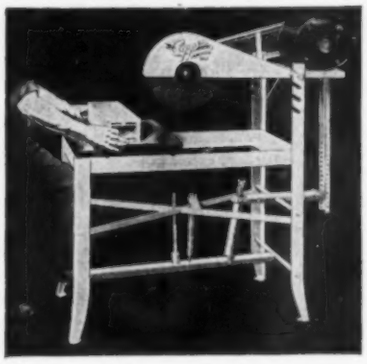
A. A. WICKLAND & CO.
ENGINEERING BUILDING • CHICAGO (6)
TELEPHONE ANDOVER 5922

FASTER CUTTING ...with Clipper Masonry Saws

Your Special Size and Shape Brick or Concrete Block can now be "Tailor-Made" at a moment's notice!

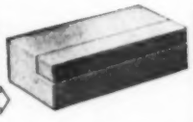


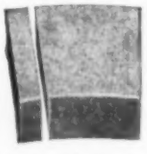
The new Clipper Multiple Cutting Principle makes possible faster cutting of every masonry material regardless of hardness.

Here are a few typical examples of the speed and accuracy with which concrete products and fire brick can be cut.

This concrete block, converted into a special size, was cut completely in two in 19 seconds.

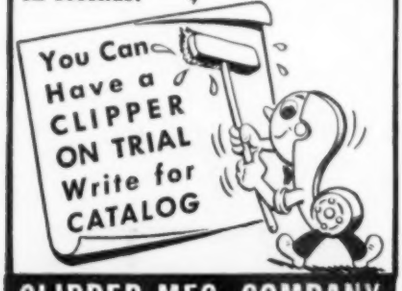
One of the many intricate cuts performed on first quality clay brick for heat treating furnaces — made in 8 sec.





Rotary Kiln Blocks, cut to size for "key" bricks in rotary kilns, require only 10 sec. for completion of cut.

Basic refractories for steel furnaces or cement kilns must be accurately installed. This magnesite brick was cut in 12 seconds!



CLIPPER MFG. COMPANY
4031 Manchester, St. Louis 10, Mo.

First-Aid Kit: Medical Supply Co., 75 West Van Buren St., Chicago 5, has designed a practical first-aid kit recommended for use in factories, foundries and shops. Dressings and medication for ordinary emergencies as well as larger injuries are separately

packed, in full view for instant selection. Steel case is dust and moisture-proof, with well designed interior planned for accessibility and sanitation. Materials may be ordered separately to keep case adequately filled. Wall brackets, carrying handle, spring locks and ample work shelf adapt this 12-lb kit to almost every need.

Melting Furnace: Ajax Engineering Corp., Trenton 7, N. J., has introduced a 20 kw induction melting furnace for aluminum alloys for use as a holding unit in die casting and perma-

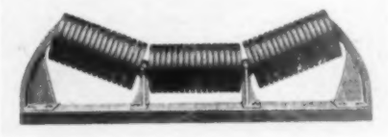
nent mold plants. Unit can be placed on floor anywhere near machines without a foundation. Small self-contained control cubicle is used to control temperature of melt within a few degrees. Bath is maintained under gentle stirring, avoiding segregation of important ingredients. Fluxing is eliminated by automatic movement of bath, automatically degassing the metal.

Rust Preventive: Pennsylvania Salt Mfg. Co., Philadelphia, recently announced a new rust preventing agent for use in water on ferrous metals before they are painted, enameled or between machine operations. The product, packaged in 25, 100 and 300 lb drums, is Pennsalt RI-50, and is used as a water solution with a concentration of 2 to 4 per cent. It is designed for protecting metals for short periods prior to application of a permanent coating, but no rinsing is required before painting.

Leggings: Safety Clothing & Equipment Co., 7016 Euclid Ave., Cleveland 3, has developed a protective legging for workers in foundries, around blast and open hearth furnaces, welding, sandblasting, and other hazardous occupations. Body of legging is of asbestos, tanned heat-resisting leather and synthetic duck. Inside front is reinforced with heavy canvas with fibre inserts for extra protec-

tion. Side stay of heavy gage non-rusting metal keeps legging firm and upright, and provides adjustment to any leg size. A long double chrome leather flare extends over entire foot, forming perfect fit over top and side of shoe. Leggings are adjustable for length of leg and foot.

Idler: Chain Belt Co., 1600 West Bruce St., Milwaukee 4, has designed an impact cushioning troughing idler for use under loading point to protect and lengthen the life of conveyor belts. Each roll consists of a rubber cylinder vulcanized directly to assembly tube. Cylinder has multiple grooves molded into it, deep primary grooves for maximum



cushioning to guard against belt carcass rupture, and shallow secondary grooves to provide surface softness for protection against belt cover laceration. Grooving permits greatest possible deflection under impact without impairment of roll stability. Momentary displacement of rubber instantaneously absorbs energy of blow, dampening impact force.

Receives Citation For War Service

Lester B. Knight, who served during the war as a lieutenant commander in the United States Naval Reserve, attached to the Bureau of Ships, recently was given a citation by Vice Admiral E. L. Cochrane, chief of the bureau. The citation states that Lt. Comdr. Knight was assigned to the Industrial Engineering Section of the Facilities Branch for duties concerned with foundry and forge engineering and operating problems arising in naval establishments and in privately owned plants under sponsorship of the Bureau of Ships, and that he also performed additional duties with the Industrial Survey Division of the Secretary's Office specializing in foundry and forge matters. "The performance of his duties required not only technical proficiency, but also imagination and initiative, which he displayed to an outstanding degree," the citation continues, "Lt. Comdr. Knight's unswerving devotion to duty and the excellence of his performance of duty were an eminent contribution to the part played by the Bureau of Ships in the victory of our arms in World War II."

Issues Booklet on Job Evaluation

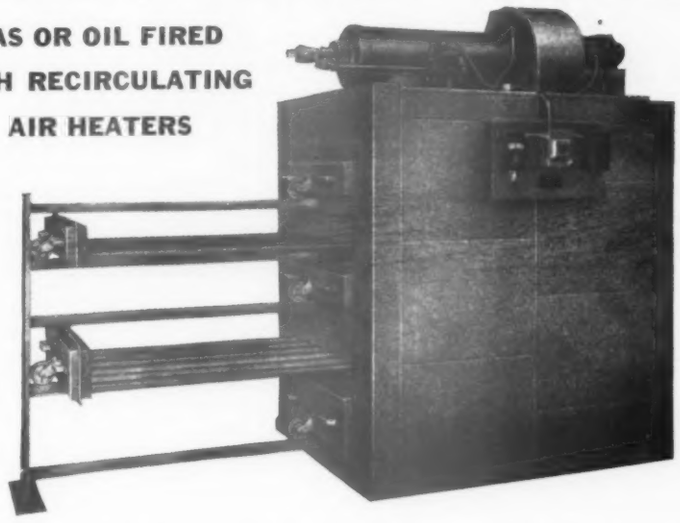
How To Control Your Labor Costs Through Job Evaluation, a special report by the field staff of the Labor Relations Institute, 1776 Broadway, New York, 19, N. Y., now issued in paper covered booklet for $2.75, presents a guide to the yeas and nays of job evaluation. It is a study claimed to enable the reader to familiarize himself with the tested and proved techniques of the process, and know, when and if the time comes, what to agree to, what to insist upon and what to guard against. The study should help in setting the foundation for a lasting and equitable wage structure that will eliminate many of the causes of employe unrest and discontent.

Scope of the work may be inferred from the list of contents: The practical approach to job evaluation; if your plant is organized; when it comes to picking a plan; let's get a little technical; what you should know about rating; of plans there are many; chart your course; job evaluation systems described; charts and diagrams.

Inland Gray Iron Foundry Inc., Watertown, Wis., has been formed by John H. Budde Sr., John H. Budde Jr., and Frederick C. Gerlach, with $25,000 capital, to manufacture various kinds of castings.

PORBECK DRAWER TYPE OVENS

GAS OR OIL FIRED
WITH RECIRCULATING
AIR HEATERS



UNIFORM CORES CONTINUOUSLY WITH LOW COST OPERATION

Strictly a *production* unit—note that all drawers operate independently of each other. Comes completely equipped with latest type temperature indicating controls (variable 100° to 650° F) and high efficiency recirculating air heater. Sturdy construction with 4-1/2" fibre-glass insulation throughout. Users commend Porbeck ovens for their space and time saving features. Available in several types and sizes. We invite your inquiry.

WRITE FOR NEW CORE OVEN BULLETIN "F"

PORBECK MANUFACTURING CO.

Manufacturers since 1894 of Core Ovens, Mold Dryers, Processing Ovens, Mold Drying Ovens, Heat Treating Ovens, and Paint Baking Ovens.

2600 N. Ninth St. St. Louis 6, Missouri

Since 1903

Strand Flexible Shaft Machines have answered the call for portable, rotary power with efficiently designed, solidly constructed flexible shaft machines that insure constant speeds with dependability and greater operator convenience.

If your job calls for grinding, polishing, buffing, sanding, drilling, reaming, screw-driving or nut-setting—especially in out-of-the-way places, a Strand machine will do it faster, better, and stand up to it longer. Hundreds of attachments can be easily interchanged. 125 types and sizes. Models include vertical and horizontal type machines from ⅛ to 3 H.P. Distributors in all principal cities.

Send today for 112 page catalog showing complete line.

Type M6A

Strand FLEXIBLE SHAFTS

N. A. STRAND & CO.
5010 NO. WOLCOTT AVE. CHICAGO 40, ILL.

NEW

"RAPID" HAND SQUEEZER

$122.00

Will handle a lot of your bench jobs and save you money by trebling your production.

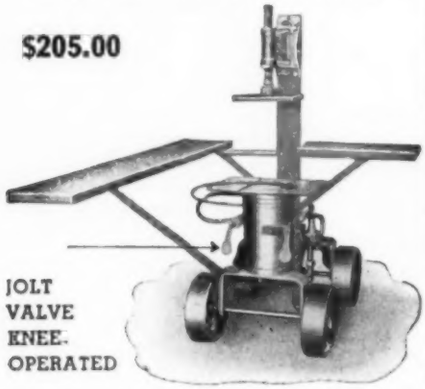
Handles flasks up to 16 x 30 inches. Comes complete with benches. Portable or Stationary Type.

★

"RAPID" R9X JOLT

30% increased jolt capacity

$205.00



JOLT VALVE KNEE-OPERATED

A Foundry producer of good molds for over 20 years.

Simple to operate.

Squeeze Plate quickly adjusted. Low initial cost.

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Write for NEW descriptive folders and Price Lists.

PIONEER

MANUFACTURING CO.

Molding Machine Manufacturer for Over 20 Years

MILWAUKEE (West Allis) WISC.

NEW TRADE PUBLICATIONS . . .

PATTERN BUYERS' GUIDE: Master Pattern Co., 1315 Main Ave., Cleveland 13, offers an illustrated 19-page ready reference guide to assist pattern buyers in selecting the right kind of equipment to suit their requirements. Precision patterns for equipment of micro-dimensional accuracy and high production expectancy as well as average patterns for equipment allowing dimensional tolerance and for limited production purposes are quickly found in this carefully planned selector.

ELECTRODES: Bulletin W8, offered by Ampco Metal Inc., Milwaukee 4, contains an industrial application chart listing industries in which its coated aluminum bronze electrodes have been used, types of proven applications in these fields, and recommended grade of bronze weldrod for each. The chart is based on actual case histories which makes it a useful guide in the selection of rod for a diversified range of applications.

CRANE CAB COOLER: Dravo Corp., 300 Penn Ave., Pittsburgh 22, has issued Bulletin 515, which describes an air-cooled conditioning unit for crane cabs. The unit, fitted to top of the cab, supplies air which is cooled, cleaned and constantly circulated. All equipment is enclosed in a steel frame housing. Maintenance consists of occasional changing of filters.

STEAM DETERGENT: Oakite Products Inc., 57 Thames St., New York 6, has published a 28-page booklet on steam detergent cleaning methods for machinery and equipment, preparing equipment surfaces for repainting or refinishing, paint stripping, and cleaning of equipment too large for tank immersion.

SAFETY POSTERS: Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7, is offering a series of 12 safety posters, drawn by J. R. Williams, creator of "The Bull of the Woods." These posters are available without charge for posting in plants.

COPPER ALLOY WELDING: C. E. Phillips & Co., 2750 Poplar St., Detroit 8, offers a 32-page handbook, "Welding and Brazing of Copper and Copper Alloys," which studies each alloy separately and selects the process which promises best results. Composition tables, welding characteristics of most commonly welded and brazed commercial copper alloy, and charts indicating methods and materials recommended for each type are indicated in the book.

TRACTOR EXCAVATOR: Trackson Co., Milwaukee 1, has issued Form No. 895, which describes a new model tractor excavator, said to be the most rugged and productive tractor shovel of its size ever offered. Standard bucket is 1 cu yd capacity and wider than the tractor tracks which makes trimming and grading more feasible. The new model not only excavates and digs, dumping directly into trucks or carrying loads when necessary, but ditches, casts, levels, landscapes, bulldozes, etc.

REFRACTORIES: Ramtite Co., Division of S. Obermayer Co., 1803 South Rockwell St., Chicago 8, has published a new catalog and data book entitled "Refractory Specialties," which contains numerous cross-sectional drawings, charts, graphs, technical illustrations, temperature conversion tables, properties of gases and other data, in the field of refractories and their applications. The book also presents information about plastic refractory products, their manufacture, design and construction.

WIRE ROPE CLIPS: American Hoist & Derrick Co., St. Paul 1, offers a pocket size information card on the use and application of clips for wire rope fastenings. Rope size in inches and minimum number of clips required are listed for ready reference.

STRESS ANALYSIS: Sales Service Division, Eastman Kodak Co., Rochester 4, N. Y., offers an 8-page folder, "Photoelastic Stress Analysis," which covers such subjects as optical theory, apparatus, models, photographic materials, analysis of records obtained and three-dimensional analysis. The pamphlet provides engineers and scientific investigators with a compact but comprehensive survey of the general photographic aspects of photoelastic stress and analysis in solving problems of stress distribution.

ARC - WELDING ELECTRODES: Metal & Thermit Corp., 120 Broadway, New York, has published a new technical bulletin covering hard surfacing alloys supplied in the form of plain, extruded electrodes of the shielded-arc type, for building up surfaces for resistance to shock and abrasion. The bulletin contains helpful information concerning such factors as effect of temperature and cooling rates on deposited metal, selection of proper grade of rod and recommended welding techniques.

GRINDER WHEEL BUSHINGS: Manhattan Rubber Division of Raybestos-Manhattan Inc., Passaic, N. J., has issued Bulletin No. 6878, which describes a new vibration dampener bushing, a resilient mounting now being built into its wheels for portable grinders. The bulletin also lists advantages derived from use of the bushings.

METAL CLEANING: Howard Engineering & Mfg. Co., 2289 Buck St., Cincinnati 14, has prepared a 48-page book containing photographs and information on the design and application of metal cleaning and finishing machinery handled by the company. Among types of machines illustrated and described are cabinet-type and conveyor-type cleaning machines, monorail washers, rotary washers, drum and inclined drum types, small parts and strip washers, tumbling, burnishing, deburring and pick-

ling machines, hot air dryers and ventilators, oil quench tanks, and solvent cleaners.

ENGINEERING EQUIPMENT: Gardner-Denver Co., Quincy, Ill., offers a colorful 36-page booklet, which gives the background of the company, its distribution of products and description of equipment and engineering service offered. The booklet is a summary of the service available to the engineering field, and contains illustrations of pumps, milling machines, rock drills, drill accessories, sharpening equipment, compressors, and other equipment for the oil and mining industries.

PYROMETERS: Bulletin 194-SA, recently published by Cambridge Instrument Co. Inc., 3050 Grand Central Terminal, New York 17, illustrates and describes a line of portable surface pyrometers for use in plants and laboratories. Among the models featured are a roll pyrometer for determining temperature of readily accessible moving rolls and other convex surfaces, an extension model for similar surfaces in hard-to-reach locations, a mold pyrometer for mold cavities or stationary surfaces of almost any contour, and a needle model for measuring sub-surface temperatures of materials in a plastic or semi-plastic state. Lists of typical applications accompany descriptions of each model

SURFACE EXAMINATION: Faxfilm Co., 1220 West Sixth St., Cleveland 13, offers a booklet describing a process for examining closely the minute details of a countless variety of surfaces. A small piece of the film is pressed on the wet surface of the subject which has been treated with solvent. Film is then peeled from specimen, placed in a micro-projector for study of details.

PROTECTIVE COATINGS: Better Finishes & Coatings Inc., Newark, N. J., has prepared a colorful, 12-page booklet, describing a peelable plastic film for protective purposes. Described as a liquid envelope, the coating is recommended for protecting finished surfaces, safeguarding tools and parts in transit and in the tool crib, in decreasing costs after assembly, and in protecting parts and assemblies from shipping floor to final installation. The film can be applied as a hot or cold spray, hot or cold dip, or with brush.

TORQUE TOOLS: Jo Mfg. Co., 8442 Otis St., South Gate, Calif., has available a catalog describing a line of tools with suggested torque values. Torque-limiting wrenches for various industrial uses are described. Tables of suggested torque values for bolts, nuts, studs, tubing fittings, suggested torque wrench readings for automotive work and suggested hacksaw blade tensions are given in the booklet.

PACKINGS: Graton & Knight Co., Worcester 4, Mass., has prepared a book on selection of mechanical packings, their application and design of adjacent parts in hydraulic or pneumatic equipment. Both leather and synthetic rubber packings are discussed. Illustrations include over 100 drawings of designs and

THEY CAME! THEY SAW!

TAMASTONE
PATTERN COMPOUND

This year more than ever before foundrymen came to the show specifically interested in Tamastone. They wanted to learn first hand how non-profitable loose and metal gated jobs could be converted into speedy profitable production. They learned that Tamastone works satisfactorily on large cope and drag work as well as saves time on jolt roll-over machines. They saw how production can be upped 400%—costs cut 75%. Tamastone can *do things* for you too! Write!

No. 90
IRON OXIDE

Caused considerable interest . . . especially the cores exhibited by courtesy of Commercial Steel Casting Co., Marion, Ohio, who report tests on sand temperatures from 500° to 3000° F. and find that 2% Iron Oxide added to their core mix gives desired hot strength with minimum expansion and good "peeling" of sand from castings up to 3" thick. *Investigate No. 90 now!*

TAMMS SILICA CO., 228 N. La Salle St., Chicago 1, Illinois

ILER
CRUCIBLE
DRAW FURNACE
SAVES MONEY
EVERY MELT

The exclusive Split-Body Design of the Iler Crucible Draw Furnace saves money because it saves time and labor. Quick, easy removal and replacement of the crucible, no tongs required. Direct pouring, no overheating necessary, no extra crucibles nor ladles. Heat is trapped in upper section of the furnace saving fuel and costly reheating time.

An automatic air-lift opens and closes the furnace at the touch of a valve saving labor and heavy hand work. Speeds up crucible changes. The furnace is mounted on legs, rests on the floor. No pit is required.

The Iler Furnace is low in first cost and economical in operation. Sturdy in construction. Offered in sizes 50-70-90-125 to accommodate crucibles of similar number. Burner for gas or oil operation optional.

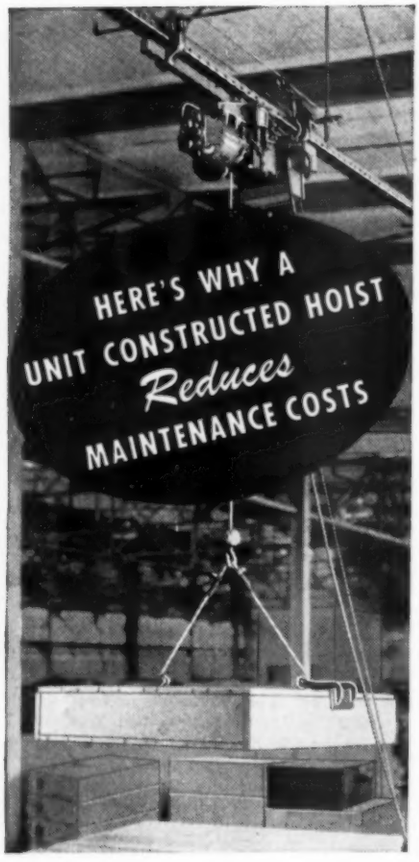
Widely used by pattern shops for making metal patterns.

Put the time-saving, money-saving Iler to work in your non ferrous operations.

Send for complete information today.

THE FEN MACHINE CO.
1350 BABBITT ROAD
CLEVELAND 17, OHIO

ILER
CRUCIBLE
DRAW FURNACES



● Maintenance men know from experience how little it costs to service a hoist that is simple in design. That's why it will pay you to switch to the simple construction of a Reading UNIT CONSTRUCTED Electric Hoist.

The hoisting unit in a Reading Electric Hoist has only four moving parts. The result is fewer wearing parts, fewer parts for you to overhaul or repair. Then too, each one of the four hoist units—suspension, motor, control and hoisting units, can be removed for maintenance purposes without the time-consuming "break-down" of any other unit.

Assure yourself of these cost-reducing advantages—contact your nearest Reading Hoist distributor, today. And for full details on the Reading UNIT CONSTRUCTION Plan, write us for your free copy of "144 Answers To Your Hoisting Problems."

READING CHAIN & BLOCK CORPORATION
2108 ADAMS ST., READING, PA.

CHAIN HOISTS • ELECTRIC HOISTS
OVERHEAD TRAVELING CRANES

READING HOISTS

applications, causes of failure and their remedies, etc. Reference tables are included to save time-consuming calculations.

METALLURGICAL SERVICE: Sam Tour & Co. Inc., 44 Trinity Place, New York 6, has prepared a folder designed to convey the scope of its metallurgical services. Types of actual assignments completed, views of metallurgical laboratory facilities, and wide range of fields covered, are shown in the descriptive matter.

CRANES: Catalog No. 77, prepared by Orton Crane & Shovel Co., 608 South Dearborn St., Chicago 5, is a 16-page book describing standard and broad gage diesel and gasoline locomotive cranes for solution of material handling problems. Charts show data concerning clearance dimensions of standard gage models, weights of re-handling and excavating clamshell buckets and normal lifting capacities of models at operating radius of 10 to 120 ft.

INDUSTRIAL SANITATION: Oakite Products Inc., 22 Thames St., New York 6, has issued a 20-page booklet describing a chemical development for control of odors and mold growth, which combines deodorizing, cleaning and disinfecting in one operation. Applications treated include cleaning and deodorizing of conveyor belts, washing of floors, sanitizing lavatories, lockers and locker rooms. The powder, mildly alkaline, is completely soluble in water, and contains no hypochlorites or iodine, nor corrosive ingredients.

LUBRICANTS: Brooks Oil Co., 315 East Carson St., Pittsburgh 19, has published a 12-page 70th anniversary bulletin which describes the properties of a modern indestructible film lubricant developed to meet requirements of increased speeds, greater pressures and high heat conditions. The bulletin gives ten examples of the lubricant's success in actual industrial use.

X-RAY UNITS: "X-ray As a Foundry Control Tool," a 4-page folder recently published by North American Philips Co. Inc., 100 East 42nd St., New York 17, is a reprint of an article by George Mullowney, industrial radiologist of that company, which describes the principles of operation together with informative cost analyses of x-ray installations for foundry usage. Specific topics include production of x-rays, equipment costs, small casting production, fluoroscopy, personnel and operational costs. Radiographs are shown of magnesium castings indicating defects most commonly encountered.

ELECTRODE CHART: Hollup Corp., 4700 West Nineteenth St., Chicago, announces an electrode chart to guide users in choice of correct electrodes for specific jobs. Chart specifies which electrode to use, suggests applications, shows currents, positions, physical characteristics, etc. Included are electrodes recommended for mild, low alloy and stainless steels, nonferrous and cast iron, surfacing, as well as gas welding rods.

SAFETY EQUIPMENT: Pulmosan Safety Equipment Corp., 176 Johnson St., Brooklyn 1, N. Y., has available a 36-page catalog describing respirators, masks, helmets and hoods for protection in dusts, fumes, vapors, paint sprays, gases, acids, sandblasting, babbitting, boiler cleaning and fire fighting. General information is included on proper equipment for protection in practically every commercial vapor or gas met in industry.

FLOORING: Norton Co., Worcester 6, Mass., has published a colorful 8-page bulletin which describes its aluminum oxide abrasive product, Alundum Aggregate. Ceramically bonded, it insures positive, permanent non-slip protection for floors, stairs and ramps. The abrasive can be applied to terrazzo, cement and magnesite floors, for showers, lavatories, washrooms, work rooms, stairs, ramps, in industrial plants for use in aisles, shipping platforms, boiler rooms, etc. Applications of the abrasive in mosaic and stair and floor tile are also described.

CAST IRON CUTTING: National Cylinder Gas Co., 205 West Wacker Drive, Chicago 5, has prepared a 16-page booklet on the cutting of cast iron with an oxygen-acetylene flame. Summary of the points outlined covers importance of heat in making successful cuts, type of equipment necessary, protection measures to be applied, and methods of approach advantageous to particular types of cutting problems.

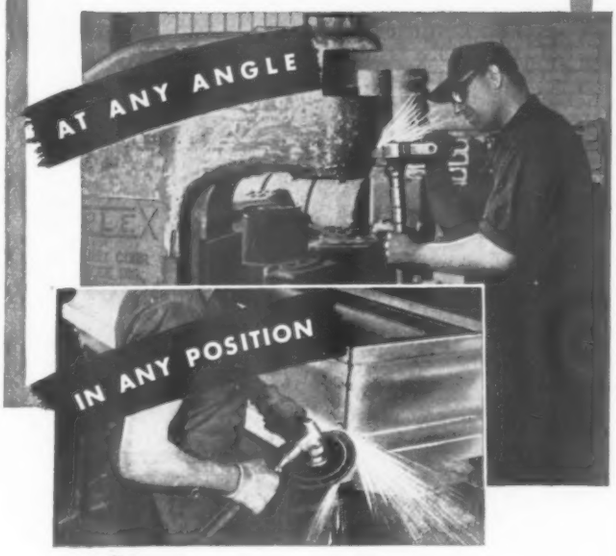
BELT CONVEYOR FURNACES: W. S. Rockwell Co., 200 Eliot St., Fairfield, Conn., offers Bulletin No. 421, which describes special features of oil, gas fired or electrically heated belt conveyor furnaces. Installations of units for all types of annealing, brazing and sintering are illustrated and described as well as designs showing carry-through, inside and outside discharge conveyors for annealing, hardening and drawing. Horizontal end heating types are also shown.

CLEANING COMPOUNDS: Northwest Chemical Co., 9310 Roselawn Ave., Detroit 4, has issued a 24-page catalog of information covering 39 different cleaning and drawing compounds. Types of cleaners described are electrolytic, immersion, solvent, spray and water wash compound. Drawing compounds included in the catalog are for brass, cold rolled steel, enameling iron, stainless steel, aluminum etc.

BUCKETS: Blaw-Knox Co., 2097 Farmers Bank Bldg., Pittsburgh 22, offers a revised bulletin, No. 2059, describing four-rope buckets for handling coal, iron ore, open hearth slag, and most granular, free-flowing materials. Line drawings show various types and manner in which they are geared and reeved.

PROTECTIVE COATINGS: Nox-Rust Chemical Corp., 2423-63 South Halsted St., Chicago 8, has prepared a catalog which gives detailed information on scientifically compounded rust preventives, protective coatings, and related industrial chemicals.

FASTER FINISHING



with Mall
REG. U.S. PAT. OFF.

FLEXIBLE SHAFT GRINDERS

Regardless of the angle or position of the work, a Mall Flexible Shaft Grinder handles every finishing job with speed and efficiency. Its constant high wheel speed, extra power and stamina accelerate grinding, sanding, wire brushing, polishing and buffing. Its caster base mounting and tilting swiveling motor make power available in any position. The flexible shaft allows the operator to use the interchangeable working tools at any angle. This complete flexibility—combined with its broad range of applications and high over-all efficiency—makes a Mall Flexible Shaft Grinder the most profitable tool any foundry could own.

Ask your Supplier for Mall Flexible Shaft Grinders, Mall-Saws and MallDrills or write direct for literature and prices

MALL TOOL COMPANY
7720 SOUTH CHICAGO AVE., CHICAGO 19, ILL.
★ *25 Years of "Better Tools For Better Work"*

Mall PORTABLE POWER TOOLS

20th CENTURY BLAST

STEEL SHOT, GRIT

The way 20th Century Blast Shot and Grit holds to its size range proves outstanding durability and accounts for its unusually effective and economical results in the cleaning department.

Made in a size for every need—accurately graded to new S.A.E. Specifications.

Write for Samples and Price List.

20th CENTURY BLAST · SHOT · GRIT

The Cleveland Metal Abrasive Co.

Main Office and Plant:
880 E. 67th Street, CLEVELAND 8, OHIO
Howell Works: Howell, Mich.

"A THERMOCOUPLE *Always ready!*"

When molten metals have "come up to heat" temperatures must be checked promptly. There can be no long delays while tips are being renewed in thermocouples.

Foundrymen appreciate the "always ready" replacement Units used in renewing Marshall Enclosed-Tip Thermocouples. These replacement Units come completely equipped with tip, refractory-insulated couple wires, and attachment lugs. To re-new a Marshall Thermocouple takes only a moment with these replacement Units.

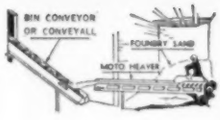
Thus the service from a Marshall Enclosed-Tip Thermocouple can be continuous and uninterrupted. Send for the descriptive Bulletin. L. H. Marshall Co., 270 W. Lane Ave., Columbus 2, Ohio.

Below are shown the replacement parts that make up the Marshall Enclosed-Tip Thermocouple, including handy replacement Unit.

As shown at right, Marshall Thermocouple replacement Units are carefully packed in corrugated containers for shipment.

MARSHALL
Thermocouples

All Purpose
MOTO-HEAVERS



UNLOAD YOUR FOUNDRY SAND WITH EASE!

Progressive foundries are now using the versatile MOTO-HEAVER to increase sand handling efficiency. This conveyor unit requires only one man operation and is powered by an electric motor. All motors and conveying mechanisms have a dust proof bearing construction. Three models to suit any purpose. Complete information as to cost and specifications will be sent on request.

Cleveland **FORMGRADER CO.**
A "BECO" PRODUCT
6723 DENISON AVENUE — CLEVELAND 2, OHIO

LADLES
for Handling and Pouring
ALL METALS

TIMKEN-WORM GEARED LADLES

These patented ladles are designed by men with over 30 years of practical foundry experience.

They offer the utmost in Safety, Dependability, Long Life, Ease of Operation, Convenience, Economy and Simplicity.

They are manufactured in all types and sizes, and are arranged for manual or electrical operation.

Our line of pouring and handling equipment is complete, including bowls, shanks, bails and tongs . . . special equipment.

INDUSTRIAL EQUIPMENT CO.
115 NORTH OHIO STREET · MINSTER, OHIO

GLUTRIN
LIQUID BINDER

GOULAC
DRY BINDER

For

CORE WORK, SAND FACINGS, SPRAYS

Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

Robeson Process Company
(Established 1905)

American Gum Products Co.
(Established 1915)

GENERAL OFFICES: 500 FIFTH AVENUE • NEW YORK 18, N. Y.

Now Available to All ... A TOUGHER BLAST CLEANING ABRASIVE

MALLEABRASIVE*

Malleabrasive lasts 3 to 6 times as long as ordinary shot. Decreases cleaning costs 50% or more, repair costs cut two-thirds, mechanical delays reduced 70%. Used during the war on vital production, now available for industrial use. Specify Malleabrasive. All sizes graded to new S.A.E. Specifications.

*Trade Mark Reg. U. S. Pat. Off.

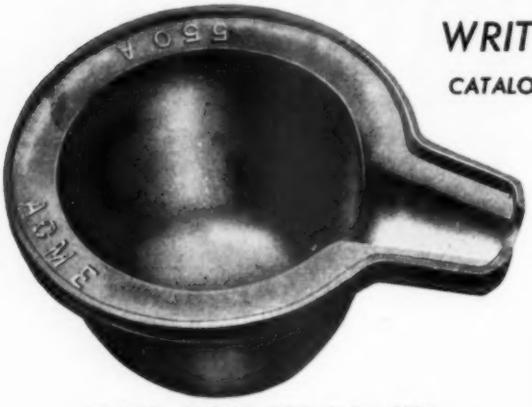
Pittsburgh Crushed Steel Co.
PITTSBURGH, PENNA.

Steel Shot and Grit Co.
BOSTON, MASS.

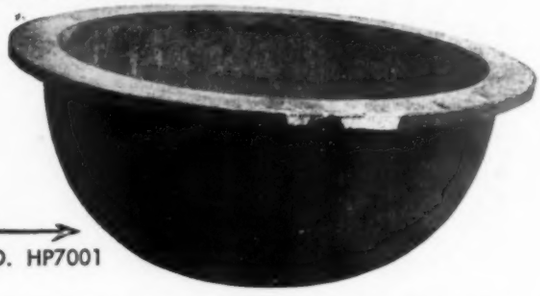
MELTING POTS—Ingot Molds

for ALUMINUM AND OTHER NONFERROUS METALS. 45 SIZES.

WRITE for CATALOG "F"



ROUND SPOUT POT NO. 550A
WITH 1¼" COLLAR ON FLANGE



HOLDING BOWL NO. HP7001

INGOT MOLD NO. AA-6

Made of Acme SPECIAL-M-Heat Resisting Iron — They Stand the Heat!

ACME FOUNDRY COMPANY

DETROIT 16, MICHIGAN

2502 TWENTY-SECOND ST. PHONE LAFAYETTE 2404

DOUBLE YOUR PRODUCTION—with the fastest and most powerful Rammer made—

NO. 4 DAYTON RING VALVE BENCH RAMMER

Aside from its efficiency, the chief advantage of this Rammer lies in its long life. The Valve Unit will last for years without repair or replacement. The Cylinder Bore and Piston Rod are HARD CHROME PLATED, features which double the life of the Rammer and reduce maintenance costs at least one-half.

Have been adopted as standard by some of the largest users of Rammers throughout the Country. MADE IN FIVE SIZES. Send for Bulletin No. 300.

DAYTON PNEUMATIC TOOL CO., DAYTON, O.

The "UNIVERSAL" Binder . . .

NOW MADE AND SOLD BY

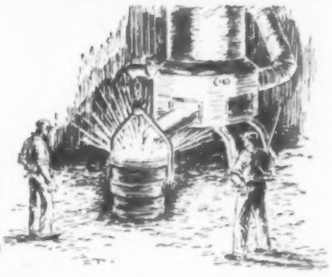
Quandt Core Oil is a unique binder that can help you cut baking time and fuel cost 30% to 60%. It is unusually free from gas, smoke, or fumes; may be used safely with finest grain sand; does not creep or migrate; assures sound, true castings of uniformly excellent finish.

Descriptive Bulletin 453 on Quandt Core Oil and Quandt Core and Mold Wash will be sent upon request.

GAMLEN CHEMICAL COMPANY

1469 Spring Garden Ave., Pittsburgh 12, Pa.
195 San Bruno Ave., San Francisco 3, Calif.

Representatives in all principal cities



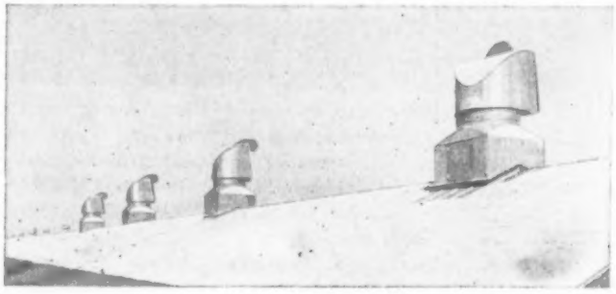
Swartwout
large scale ventilation
improves your working conditions—helps you attract more man-power

At a surprisingly economical cost you can make your foundry a much more attractive place to work in.

Swartwout Roof Ventilators and Intake Louvers, properly distributed to handle your ventilation problems, give you a fume, smoke and dust removal system that helps increase working efficiency and improve employee comfort.

Swartwout builds sturdy, scientifically designed ventilators for either gravity or power air movement—recommends effective combinations to provide most economical handling of your various ventilation needs. Write for full information.

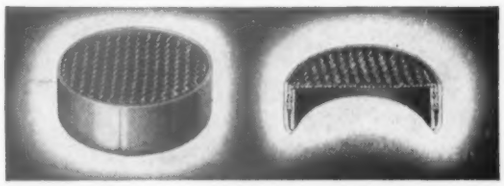
The Swartwout Co., 18511 Euclid, Cleveland 12, Ohio



Swartwout
The Airmover Line
EQUIPMENT FOR EFFECTIVE ECONOMICAL VENTILATION OF INDUSTRIAL BUILDINGS

CORE BLOWERS!

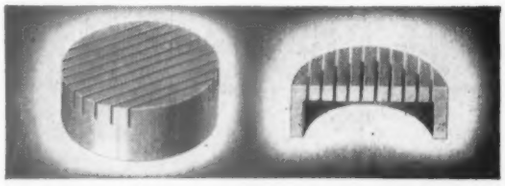
NO BLOWOUTS with RIENACKER CORE BOX VENTS



SCREEN TYPE—Patent No. 2,263,974

For HIGH-SPEED production. Made from 30 mesh monel screen lapped 3/16" over brass innertube and firmly secured with brass outertube, making a strong, fool-proof unit. Each vent is sized through a die assuring accurate fit. The compression between outer and inner tubes holds screen securely in place without slightest danger of blow-out. Costly work stoppages to repair or replace vents are eliminated.

Use Rienacker core vents (screen type) whenever possible—on all flat surfaces, and on curved surfaces wherever core marks are unimportant. You get fastest air escape with minimum liability of clogging.



SLOTTED TYPE—Patent No. 2,238,506

For CONCAVE and CONVEX RADII. Made of brass, precision slotted for greatest air escape possible with this type of vent. Standard slot width for cast iron .014; for brass .010. Core vent hole should be made with a step-drill so that bottom of vent rests on shoulder thus provided. This slotted vent is easily shaped to any curved surface; leaves no core marks on casting.

• • •

Write for information and prices on gas escape vent bushings for use with round or rectangular vent rods. Round bushings in all drill rod sizes; rectangular bushings: 3/32" x 1/4"; 3/32" x 3/8"; 1/8" x 1/4".

DEALERS IN ALL PRINCIPAL CITIES

RIENACKER INDUSTRIES, INC.

2035 Hilton Road • Detroit 20, Mich.

Hundreds of leading Pattern shops and Foundries acclaim this modern coating.

PREVENTS warping, swelling, wear and deterioration.

PROTECTS AGAINST oils, water, waxes, kerosene and gasoline.

Yes, Hardlac answers every requirement for a safe, ready-to-use pattern coating. This specially developed McDougall-Butler product brushes easily, dries quickly to provide a smooth even protective coating on any wood pattern. Molding sand won't stick to a Hardlac surface even when packed by "slinger" or tamp methods. Save time—save disappointments—start HARDLACing your patterns right away.

Made in clear and standard colors red, yellow and black to conform with A.F.A. recommendations. Write for name of your nearest supplier.

McDOUGALL-BUTLER CO., Inc.
MAKERS OF VARNISHES • ENAMELS • PAINTS
BUFFALO, NEW YORK

"OLIVER"

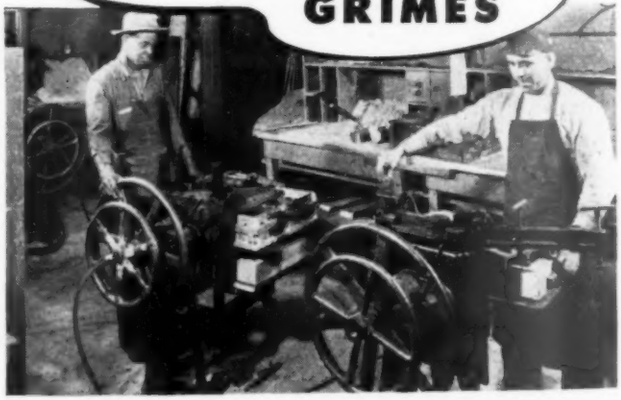
Double Arbor Universal Tilting Saw Bench

- Table always remains horizontal
- Saws tilt up to 45 degrees
- Either Rip or Cross-cut Saw instantly available
- Automatic Electric Brake
- Precision ball bearings for lasting service

Write for Illustrated Bulletin No. 260D

OLIVER MACHINERY COMPANY
GRAND RAPIDS 2, MICHIGAN

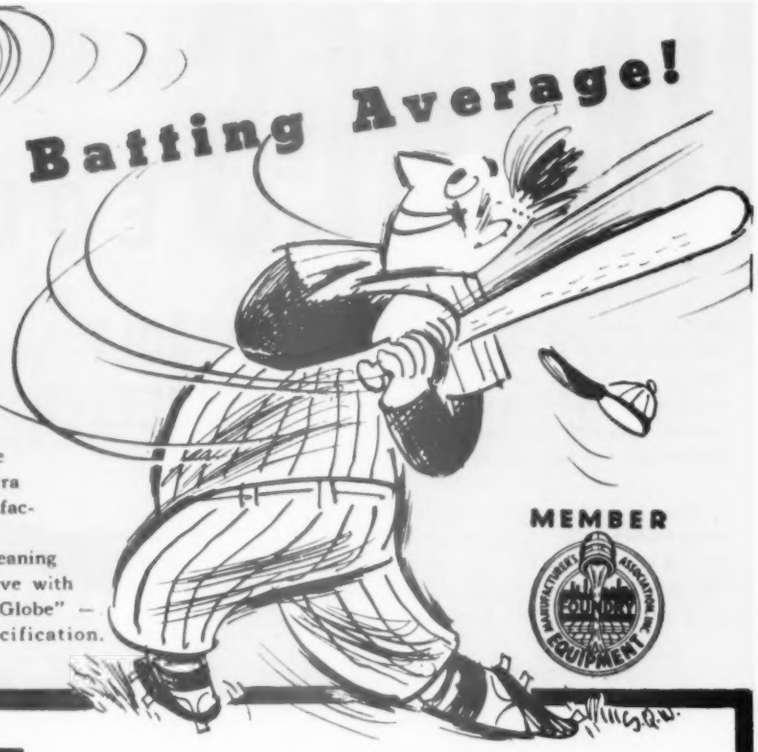
FOUNDRIES LARGE AND SMALL DEPEND ON GRIMES



● Everywhere large, medium and small foundries are depending on Grimes Molding Machines to produce superior molds demanded by exacting foundrymen. Beside the Grimes Hand Rammed Roll-Over Machine (shown above) there are Hand Rammed Power Roll-Over Machines and Jolt Powered Roll-Over Machines to meet every molding need. Learn to *depend on Grimes* for *your* foundry needs. Ask for complete data.

GRIMES MOLDING MACHINE CO.
4161 WRIGHTWOOD AVE., CHICAGO 39, ILL.

For A High Batting Average!



in the blast-cleaning league
—standardize on GLOBE

Records for long life have been set in many foundries by Globe "H-C" Chilled Shot and Globe Cornered Grit.

There's 37 years of metallurgical experience wrapped up in every pellet . . . plus the extra values represented by Globe's special manufacturing processes.

Make sure you get maximum precision cleaning and longest service life by ordering the abrasive with maximum hardness and toughness. Specify "Globe" — all sizes graded to the new S. A. E. specification.

MEMBER

GLOBE STEEL ABRASIVE CO.

MANSFIELD, OHIO

RADIUM RADIOGRAPHY *Performs a* NEW FUNCTION

PHOTOGRAPH COURTESY OF CRANE CO.

"Directional solidification" can easily be studied by the set-up illustrated in the photograph—to indicate the best method of casting with a minimum of defects in the casting itself.

Radium has become a new foundry tool which directly effects an increase in yield. It permits accurate determination of the proper procedure in gating and risering "tough" castings. Seventeen cylindrical castings were radiographed simultaneously by Crane Co. to ascertain the most productive and economical foundry practice.

Radium thus performs a valuable additional function.

For inspection, for determination of directional solidification, Radium is available in capsules of various unit strength in duralumin holders which may be leased or purchased at low rates.

The rental includes full coverage insurance, heavy lead storage containers and slide rule exposure calculators.

Write us concerning any problem of Gamma Ray Radiography

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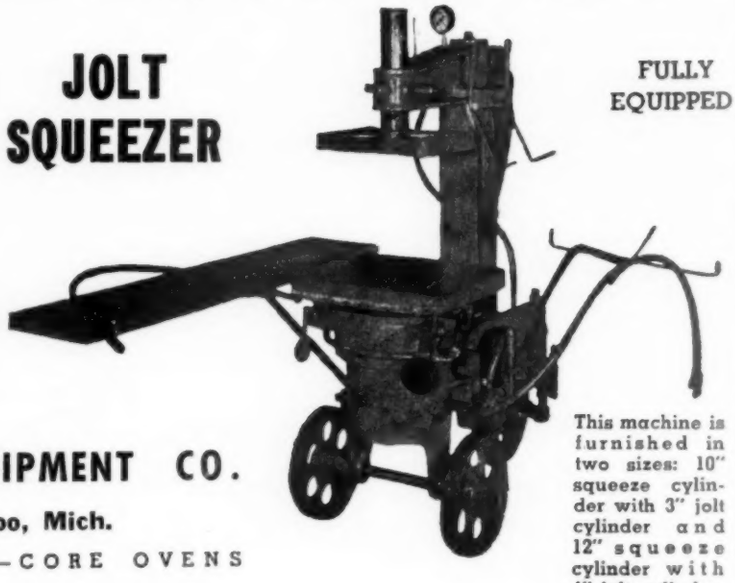
HAYNES EQUIPMENT

JOLT SQUEEZER

FULLY EQUIPPED

● The post and squeeze cylinder on the HAYNES JOLT SQUEEZER is cast all in one piece. There are no bolts or screws in this machine. The top of the post is machined on top with a 2 7/16" cold rolled shaft which the swing arm swings on.

This is a portable machine with three wheels, two in front, one in back, zerk fittings on all moving parts. Comes equipped with air gauge, pop-off gauge and a pin on top of the arm for a gate horn.



This machine is furnished in two sizes: 10" squeeze cylinder with 3" jolt cylinder and 12" squeeze cylinder with 4" jolt cylinder.

HAYNES FOUNDRY EQUIPMENT CO.

1734 Lake Street—Kalamazoo, Mich.

LADLES—BRASS FURNACES—CORE OVENS

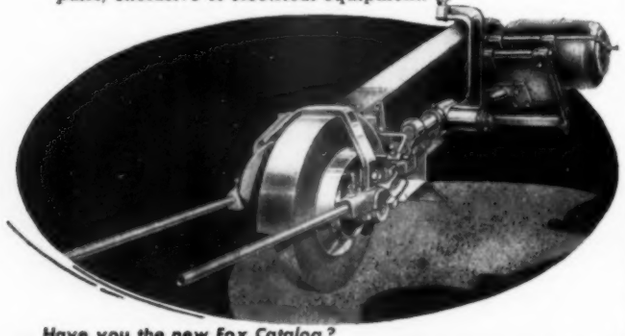
FOX

SWING FRAME GRINDER

● **BALANCE** Perfect center balance of wheel and motor ensures grinding ease and efficiency.

● **SAFETY** "Worker safety" is carefully provided.

● **ECONOMY** Greasing required only once every six months . . . guaranteed for two years against repairs, exclusive of electrical equipment.



Have you the new Fox Catalog?

FOX GRINDERS, INC.

OLIVER BUILDING PITTSBURGH 22, PA.

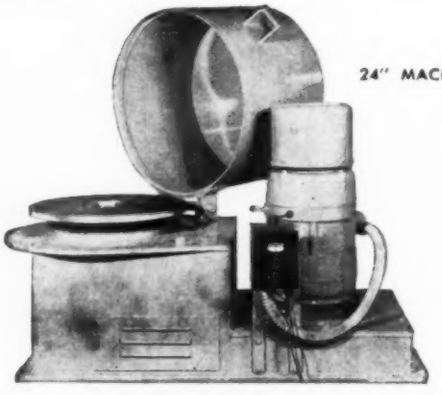
CENTRIFUGAL CASTING MACHINES
VERTICAL, HORIZONTAL

Designed and built to meet specific requirements for steel, gray iron, malleable and all nonferrous metals.

The most progressive foundries are already investigating the possibilities of Centrifugal Casting on their product.

For better castings, increase furnace yield, less scrap, reduced machining cost.

We have engineers available to make complete studies to determine investment, production cost, and make recommendations.



24" MACHINE

AIMES ENGINEERING CO., FOUNDRY DEPT.

1783 East 11th Street

CLEVELAND 14, OHIO

(runs all day on a gallon of gas)

here's graphic proof of

"Chore Boy" Savings!

Job "A"	WITHOUT CHORE BOY	24 MAN-HOURS	
	WITH CHORE BOY	6 MAN-HOURS	SAVING 300%
Job "B"	WITHOUT CHORE BOY	4 MAN-HOURS	
	WITH CHORE BOY	¾ MAN-HOURS	SAVING 433%
Job "C"	WITHOUT CHORE BOY	5½ MAN-HOURS	
	WITH CHORE BOY	1 MAN-HOURS	SAVING 450%
Job "D"	WITHOUT CHORE BOY	7½ MAN-HOURS	
	WITH CHORE BOY	7/8 MAN-HOURS	SAVING 759%
Job "E"	WITHOUT CHORE BOY	6 MAN-HOURS	
	WITH CHORE BOY	2½ MAN-HOURS	SAVING 140%
Job "F"	WITHOUT CHORE BOY	4½ MAN-HOURS	
	WITH CHORE BOY	1¾ MAN-HOURS	SAVING 157%

(the truck of a thousand uses)

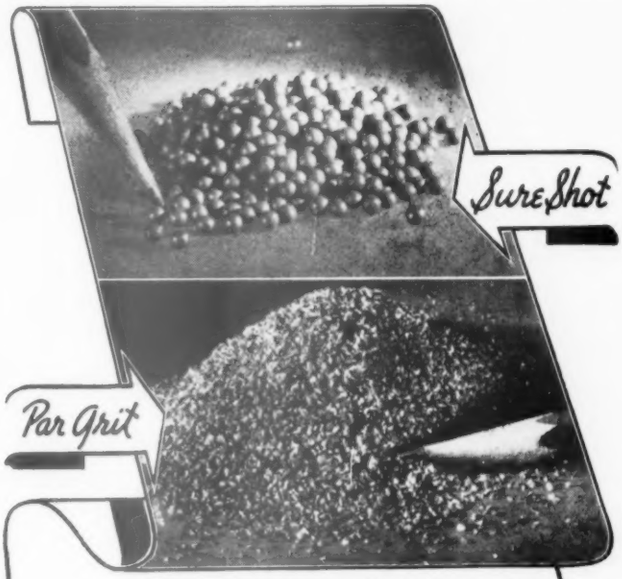
• The man-hour savings graphically presented on the chart above are only a small, but typical cross-section of the numerous cases throughout foundries and other industries wherein the sturdy . . . speedy . . . economical, labor-saving "Chore Boy" is outperforming heavier, more costly trucks on all kinds of material handling jobs. Write or wire for full details.

BUDA

15457 Commercial Avenue
HARVEY *(Chicago Suburb)* ILLINOIS

STEEL Abrasives

That Clean Better and Faster!



Accurate Controlled Analysis
Plus Uniform Heat Treating Guarantees
Unusually Hard, Tough Steel Abrasives

"SURE SHOT" and "PAR GRIT" abrasives set a new standard in uniformity, sharpness and cleaning action. For greater speed on production work it will pay you to use these outstanding abrasives—they clean faster—last longer. Sizes available to cover every requirement.

Immediate Delivery

All quantities shipped in double 100-pound bags, insuring safe delivery. Ton and carload lots available.

MODERN SCREENING SYSTEM GUARANTEES ACCURATE SIZES · · · GRADED TO THE NEW S.A.E. SPECIFICATIONS

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You are invited to consult us on any metallurgical problem. Specific products for specific results tested and improved through 18 years' practical experience.

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are scientifically blended—laboratory tested. *FLUXES* for melting, protecting, refining and degassing *aluminum, brass, bronze and grey iron alloys. A. B. C. FOUNDRATE FLUXES* assure *more* metal in the castings —*less* metal in the skimmings. Results are better castings at lowered costs.

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MICAWASH and MICAPARTE for core and mold washes—also parting compounds —for all ferrous and non-ferrous alloys. (Contain no free silica.)

COATING COMPOUNDS for die casting —permanent molds—forging dies—centrifugal casting.

MICA LUBE supplies a clean, light-colored *Lubricating Film* suitable for *High Temperatures* without black smoke, dust or heavy fumes.

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CONSTRUCTION MACHINERY CO.
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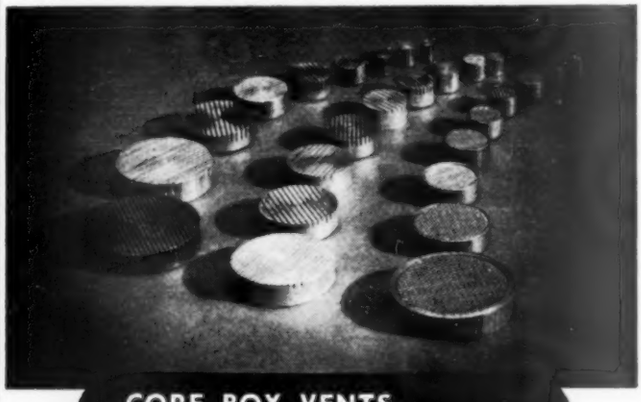


CORE BOX VENTS TO FIT EVERY NEED

Here's part of a complete line of DEMMLER core box vents—rigidly constructed in varying sizes of slotted brass—slotted steel—and screen mesh. Orders filled promptly from stock!

BRASS SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

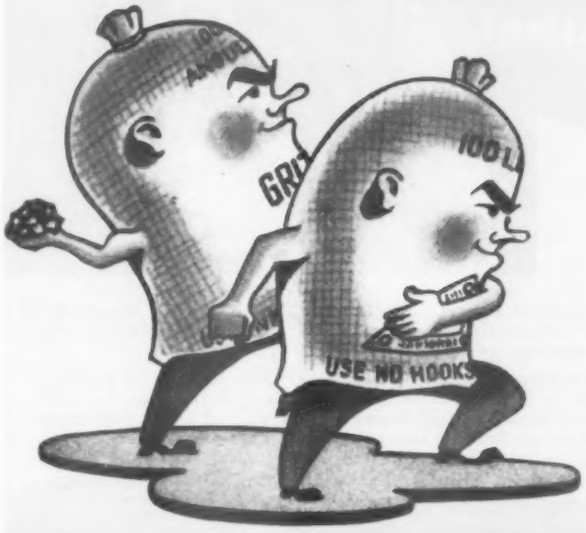
STEEL SLOTTED CORE BOX VENTS
Slot widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SCREEN TYPE CORE BOX VENTS
Mesh: #30, #40, #50.
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

SPECIFICATION CIRCULAR ON REQUEST

Wm. DEMMLER & Bros
Kewanee, Illinois
MANUFACTURERS OF CORE BLOWERS EXCLUSIVELY SINCE 1911

MIGHTIER MIDGETS



because a returned alloy makes them harder and more durable

CERTIFIED Grit and Shot have always been recognized as the fastest-cleaning, longest-lasting abrasives. Now — with the addition of an alloy just released from war restrictions — you can expect even better results and longer life.

No blast-cleaning equipment can give you performance any better than the quality of the abrasives. All sizes graded to the new S. A. E. specifications. For most uniform and economical results, specify "CERTIFIED" —the metal abrasives made with the extra-hard alloy and the automatically-controlled heat treatment.

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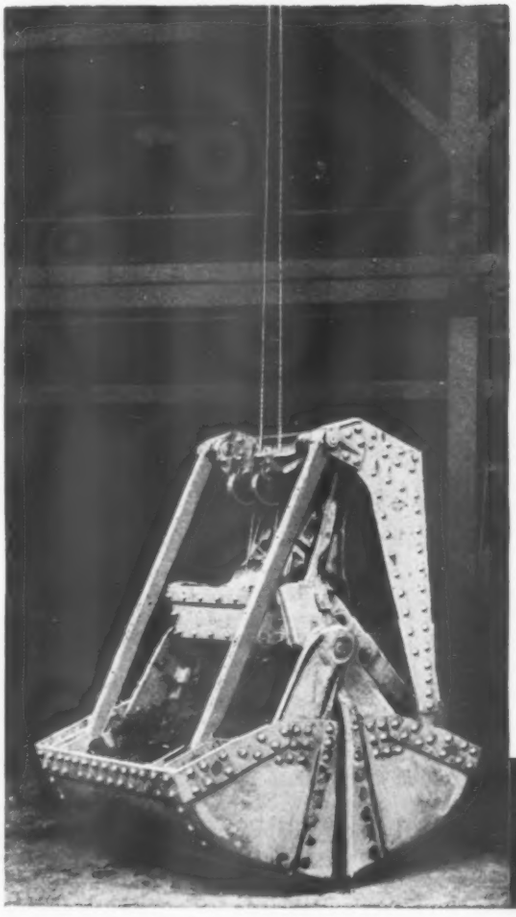
PITTSBURGH, PENNA.
Steel Shot and Grit Co.
BOSTON, MASS.



Not Adapted to—but DESIGNED for FOUNDRY USE

Any foundryman who investigates the Blaw-Knox line of buckets can tell that a thorough study of foundry requirements has gone into their design . . . There's a wide variety of Single Line, Hook-on types for both low headroom and extremely low headroom installations . . . Check your requirements and operating conditions against Blaw-Knox specifications and you'll come up with the bucket that's exactly right for the job.

BLAW-KNOX DIVISION OF BLAW-KNOX COMPANY
2097 FARMERS BANK BUILDING, PITTSBURGH, PA.
NEW YORK CHICAGO PHILADELPHIA BIRMINGHAM WASHINGTON
Representatives in Principal Cities

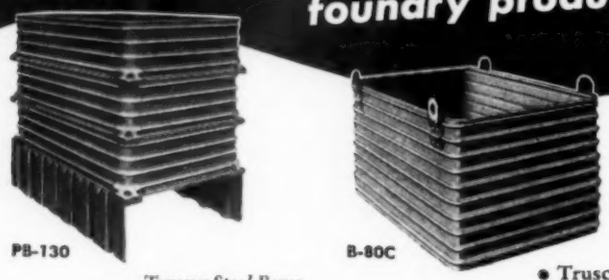
◀ No. 3125 Single Line "closed head" Hook-on Type bucket. Safety hub trip. Concealed hinge stops. Capacity 1½ cu. yds.

No. 309-F. A ¾ cu. yd. Hook-on Type ▶ bucket designed especially for Foundry use. Requires only 6'-7" operating headroom . . . For complete data on these and other Blaw-Knox Buckets for the Foundry, write for Catalog No. 2002.

BLAW-KNOX BUCKETS

TRUSCON STEEL PRODUCTS

for more efficient foundry production!



Truscon Steel Boxes

• Truscon Steel Foundry Flasks, and Truscon Steel Boxes and Skids for materials handling, make a great combination for smooth-running, profitable operation in any plant.

There are types and sizes available to meet your exact requirements. Write for illustrated literature on Truscon Steel Foundry Flasks, and Truscon Steel Boxes and Skids, and ask for an experienced Truscon foundry man to help adapt them to your schedules.

Truscon Steel Foundry Flasks

Truscon Steel Foundry Flasks

TRUSCON STEEL COMPANY, Pressed Steel Division • 6100 Truscon Ave., Cleveland 4, Ohio • Subsidiary of Republic Steel Corporation

"No wonder production has increased . . . we're getting a longer run and greater yield—better castings too!"

Continuous casting without bearing failure . . . . Learn about the patented "Miracle Hub" today!

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ONE WAY TO CUT PRODUCTION ON DEFECTIVE CASTINGS

USING sand slightly out of condition tends to produce defectives—on which you lose both cost and profit.

N & F super-concrete stave sand storage bins will permit you to buy sand already conditioned, store it that way, and hold it "ready to go."

Many foundries obtained top priorities and installed N & F bins during the war—government rating them essential equipment. Probably you should also install bins for sand storage.

THE NEFF & FRY COMPANY
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SAND STORAGE BINS

For Forty-Three Years

we've been helping foundries with our advisory and consulting service on

- **Metallurgy**
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to find the cause and suggest the means for eliminating DEFECTIVE castings. Our two laboratories, at Buffalo and Chicago offer you prompt and accurate service on photomicrographs, physical testing and chemical analysis on ferrous and non-ferrous materials, sand, coal, coke, fluxes, oils and other metallurgical materials.

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we offer an additional service due to the completion of our modern

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Metallurgists • Chemists • Foundry Engineers

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Expansion + "1000 baffles" = 99% efficiency

● Here is the compressed air separator that combines the two best principles of separation . . . that removes more than 99% of the trouble-causing water, dirt and oil. First a controlled expansion precipitates most of the moisture. Then the "Thousand Baffles" — a labyrinth of coarse mesh — changes flow direction repeatedly to capture the remaining foreign particles. Johnson Separators are available in sizes and styles for all needs—and for service on steam lines, too.

NEWEST idea in separator design is the Johnson Type SA —a self-draining separator with automatic trap mechanism built in. The line also includes Aftercoolers, to condense vaporized moisture—and Oil Absorbers, to remove every trace of oil.

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JOHNSON *separation devices*

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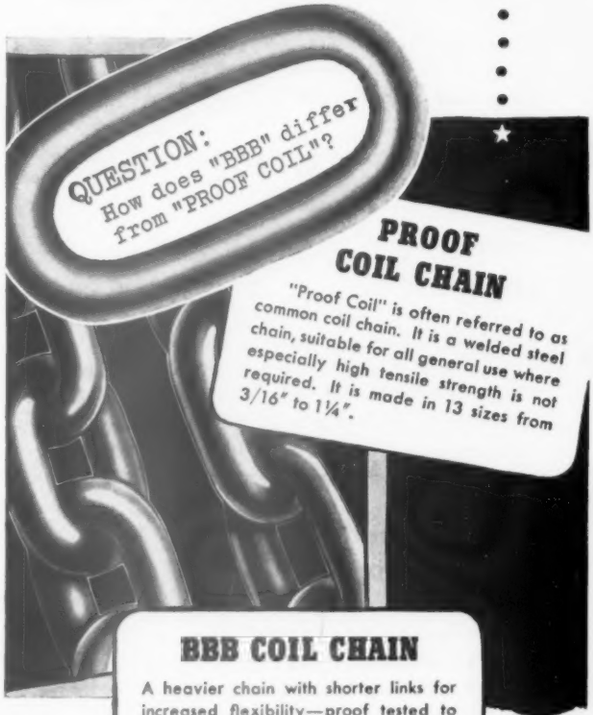

PROOF COIL CHAIN

"Proof Coil" is often referred to as common coil chain. It is a welded steel chain, suitable for all general use where especially high tensile strength is not required. It is made in 13 sizes from 3/16" to 1¼".

BBB COIL CHAIN

A heavier chain with shorter links for increased flexibility—proof tested to higher loads than Proof Coil. Made in same range of sizes as Proof Coil.

In either of these chains—or any other of the many types of welded and weldless chain—you can take high quality and uniformity for granted when you "Buy American."

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American Chain Division makes all types of electric welded and fire welded chain – all types of weldless chain made of formed wire or stampings – a complete line of chain fittings, attachments and assemblies – repair links – cotter pins.

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AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

The welder who has just tried NI-ROD for welding cast iron

Judging from all the fine reports we've been receiving, new users of Ni-Rod certainly must be a happy lot.

And, when we hear..."*Best rod we've ever had*"..."*Never found preheating necessary*"..."*The answer to a foundryman's dream*"...we're pretty happy ourselves and glad we spent the time and money needed to develop this easy-handling electrode.

Here's what Ni-Rod gives you in performance:

- Stable arc in all positions
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- Excellent "wash"
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- Works on either A.C. or D.C.

—and in weld quality:

- High-strength deposit
- Easy machinability
- Thorough fusion
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- Close color match

Order a 5-lb. package right away. Have your welders try it on the next defective casting that comes along...and then listen to what *they* have to say.

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Model AS

These machines used to make ferrous and non-ferrous centrifugal castings are produced by the pioneer manufacturer of such equipment.

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They are made in a large variety of styles and a wide range of sizes. Complete technical information is supplied concerning sand and permanent mold design, gating, sand mixes, speeds, etc.

Model M

Send us drawings or sketches of parts you are interested in casting centrifugally, and we will tell you, without obligation, if and how our machines can cast them faster, cleaner and with fewer rejects.

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"FLUXUATIONS NO. 14"

- Permanent Mold Casting of Aluminum Alloys.
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- Liquid Shrinkage of Castings.

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HELPFUL LITERATURE

NOTE TO READERS: If you will check the item or items described which particularly interest you, we will be glad to request the manufacturers concerned to send you their literature. Use the attached postal card

1. Hydraulic Control

Monarch Road Machinery Co.—4-page illustrated booklet covers Hy-Lo-Jack automatic power hydraulic control for mobile and similar equipment. Full specifications are given.

2. Air Traps

Armstrong Machine Works—4-page illustrated bulletin No. 143 is descriptive of snap-action, standard ball float and inverted bucket air traps used in draining water out of compressed air separators, aftercoolers, tanks and lines. Cross-sectional drawings show construction features.

3. Overhead Chain Conveyors

Lamson Corp. — 20-page illustrated booklet contains data on overhead chain conveyors for use in manufacturing operations, traveling stockroom procedure, stockrooms and warehouses, packing and shipping departments. Power units for overhead chain conveyor lines are described briefly.

4. Bronze Electrodes

Eccles & Davies Machinery Co.—16-page illustrated booklet describes physical and chemical properties of Edco yellow-shielded phosphor-bronze electric welding rods. Uses and techniques for welding various materials are given.

5. Laboratory Ware

Norton Co.—12-page illustrated bulletin "Alundum Laboratory Ware" describes fused alumina materials mixtures, crucibles, filter cones, combustion boats and other laboratory ware. Properties of Alundum and dimensions of laboratory ware are given.

6. Full-Revolving Cranes

Orton Crane & Shovel Co.—24-page catalog No. 74 entitled "Moving Materials from Here to There" contains case histories of full-revolving crane installations to solve materials handling problems in different fields. It is intended as an idea book to help in solution of reader's problems.

7. Grinders

Hammond Machinery Builders, Inc.—16-page illustrated folder "Hammond of Kalamazoo" gives data on abrasive belt, carbide tool and general purpose grinders, as well as on polishing lathes. Brief descriptions are included on automatic and cylindrical finishing machines.

8. Fork Lift Trucks

Service Caster & Truck Div., Domestic Industries, Inc.—26-page illustrated catalog contains data on design, features, construction and operation of gas-powered MoTowLift fork lift trucks for maximum capacity of 4000 pounds.

9. X-Ray Casting Inspection

North American Philips Co.—4-page illustrated booklet No. R1023 is entitled "X-ray As a Foundry Control Tool" and is written by George Mullowney, industrial radiologist. Topics covered are: "How X-rays are produced", "Equipment costs", "Small casting production", "Fluoroscopy", "Personnel", and "Operational costs."

10. Pneumatic Equipment

Gardner-Denver Co. — 32-page illustrated brochure entitled "Engineering Foresight . . . Manufacturing Progress" relates history and facilities of company and shows typical products manufactured. Included are air compressors, rock drills, air tools, air hoists, air motors, centrifugal pumps, duplex pumps and governors.

11. Air Cleaning Equipment

American Air Filter Co.—252-page illustrated loose-leaf catalog "A" contains complete set of bulletins on air filters, Roto-clones and electric precipitators. Complete information and technical data on air filters, dust control equipment and special products are presented.

12. Engineering Service

Sam Tour & Co.—4-page illustrated bulletin entitled "Go Forward with Metallurgical Answers" describes engineering, metallurgical and consulting services available for foundries. Scope of process and product development; testing and research; plant layout and production guidance; industrial, legal and patent investigations are discussed.

13. Belt Conveyor Furnaces

W. S. Rockwell Co.—6-page illustrated bulletin No. 421 describes oil or gas fired or electrically heated belt conveyor furnaces for annealing, hardening, drawing, normalizing, copper brazing, silver soldering and sintering. Numerous typical installations are pictured and drawings show construction.

14. Snap Molds

Fellows Corp.—4-page illustrated bulletin entitled "How to Produce 360 Snap Molds Per Hour" describes company's methods and machines used in production of snap molds from match plates. Advantages and operations of systems and match plate molding units are covered.

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15. Materials Handling Tractor

Trackson Co.—4-page illustrated bulletin No. 895 describes model IT4 Traxcavator, 1-cubic yard tractor shovels mounted on standard Caterpillar track type tractors. Unit can be used with bulldozer or Anglegrader which are also available.

16. Clamshell Buckets

Blaw-Knox Co. — 44-page illustrated catalog No. 2059 describes four-rope clamshell buckets. Drawings show types of buckets and manner in which they are geared and reeved. Specifications and engineering data are included.

17. Oven Furnaces

Surface Combustion Corp.—8-page illustrated bulletin No. OG-43 is descriptive of large and small gas-fired oven furnaces. Design features and advantages are listed and numerous photographs show typical installations.

18. Safety Posters

Peninsular Grinding Wheel Co.—Series of colorful 17 x 22-inch posters fosters safety in handling and use of grinding wheels. Cartoons are drawn by J. R. Williams, creator of "The Bull of the Woods".

19. Acetylene Generators

Sight Feed Generator Co.—18-page illustrated booklet describes acetylene generators, soldering and brazing equipment, floodlights, flarelights, acetylene dehydrators, filter cartridges and various types of regulator and relief valves.

20. Welding Lenses

Eastern Equipment Co.—4-page illustrated catalog section No. AWP-21 describes line of Amcoweld lenses for industrial eye protection. Sizes and types are available for specti-goggles, goggles, helmets and handshields.

21. Hydraulic Presses

Laboratory Specialties, Inc.—8-page illustrated booklet and supplementary data sheets describe laboratory hydraulic presses and accessories for testing, control and research. Specifications, dimensions and prices are covered.

22. Fan & Blowers

Clarage Fan Co.—8-page illustrated bulletin SE-1 is descriptive of Clarage fans, air washers, conditioning units, unit heaters and mechanical draft equipment. Performance tables and specifications are given on all units.

23. Grinding Wheels

General Grinding Wheel Corp.—6-page illustrated folder is descriptive of grinding wheels made for grinding, snagging, cutting off and polishing operations. Wheels are made in rubber, resinoid, vitrified and special bonds.

24. Cast Iron Cutting

National Cylinder Gas Co.—12-page illustrated technical bulletin form No. N606 is entitled "How to Cut Cast Iron". Text is intended for men with some practical knowledge of oxyacetylene flame cutting. Discussed are simplified methods, techniques and procedures.

25. Blast Cleaning Equipment

American Foundry Equipment Co.—16-page illustrated catalog No. 264 presents data on 60 x 96-inch Wheelabrator Tumblast airless blast cleaning equipment. Detailed information including installation photos, construction features, dimensional drawings and specifications are given. Units are available in eight sizes with capacities from 1 to 63 cubic feet.

26. Electric Furnaces

K. H. Huppert Co.—38-page illustrated catalog contains data on company's line of floor and table type heat treating and laboratory furnaces. Temperature control and indicating instruments, and stands for table model furnaces are described. Supplementary price list is included.

27. Surface Pyrometers

Cambridge Instrument Co.—12-page illustrated bulletin No. 194-SA describes Cambridge Roll pyrometer, extension model, mold pyrometer for mold cavities, and needle model for measuring subsurface temperature of materials in plastic or semiplastic state.

28. Odor Control Material

Oakite Products, Inc.—20-page illustrated booklet form 6163R describes Tri-San which is chemical material for control of obnoxious odors. It deodorizes, cleans and disinfects. Methods of use are discussed.

29. Bronze Electrodes

Ampco Metal, Inc.—10-page bulletin No. W-8 is industrial application chart on Ampco-Trode coated aluminum bronze electrodes. Industry use, recommended types, grades and other data are listed.

30. Crane Cab Air Conditioner

Dravo Corp.—4-page illustrated bulletin No. 515 describes air cooled conditioning unit for crane cabs working over hot locations or where acid fumes are present. Unit is self-contained, requires only one electric power connection, and utilizes changeable filters.

31. Revolving Mold Conveyor

Roto-Cast Foundry Equipment, Inc.—4-page illustrated booklet contains data on revolving mold conveyor for nonferrous foundries. It is available in three standard sizes of 10, 12 and 14-foot diameters.

32. Salt Tablets & Dispensers

Standard Safety Equipment Co.—8-page illustrated folder is price list and service unit identification for Fairway salt tablets, combination tablets and dispensers. Koolpad light weight, ventilated sweatbands are described.

33. Rust Preventive

Rusticide Products Co.—4-page illustrated folder entitled "Stop Rust With Rust-I-Cide" explains advantages of Rust-I-Cide which stops and removes rust when applied to water tanks, bridges, metal sash, machinery, metal buildings, chain link fence, pipes, motor parts, gas tanks, industrial heaters and similar units.

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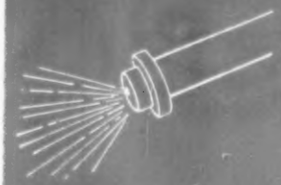

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IT'S BACK AGAIN

With 5 good reasons for its popularity

1. Because of its fracture resistant structure Cleanblast Alloy 99 shot is far superior to regular material, and will lower your consumption of shot by a large percentage.
2. Cleanblast Alloy 99 shot will reduce wear on all machine parts that come in contact with the abrasive. This also means a savings due to breakdown delays and parts replacement.
3. With less material required, a considerable yearly saving is gained due to lower freight costs.
4. Handling and storage represents still another saving when you use Alloy 99 Shot. Your workmen are required to handle much less material.
5. Cleanblast Alloy 99 shot fractures at a much slower rate and into much larger pieces than regular shot. This results in less dust and lower disposal costs.

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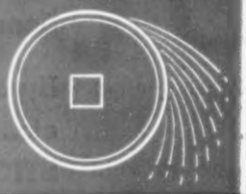
"Alloy 99" SHOT



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Industry's compressed air must be dry.
But air under compression contains moisture!

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AFTERCOOLERS,
SEPARATORS,
TRAPS ARE
GUARANTEED
TO
BANISH MOISTURE
FROM COMPRESSED AIR
No job too large and none too small.

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Write for particulars
giving capacity of your compressed air system
and outlining condition
to be overcome.

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Moisture Elimination Up To 3000 Pounds Per Square Inch

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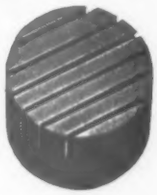
CORE  BOX

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"A Specific Type for Every Core Box"

- Made of brass and diameter held to close tolerance.
- May be machined to any contour without removal from the core box or plate.
- "Shallow" or "deep" head.
- "Narrow" or "wide" slots.
- Easily inserted.
- Easy to clean.
- Greater vent area.
- Rapid Escape of air.

Write for full information on Smillie Cleaning Tool and Smillie Inserting Drill.

C. M. SMILLIE & CO.
11100 WOODWARD BLVD. FERNDALE 20, MICH.
TOOLS • PRECISION SCREW MACHINE PRODUCTS • FIXTURES • SMILLIE CORE BOX VENTS
PRECISION XX—MEANS THE EXTRA VALUE IN SMILLIE PRECISION PARTS, TOOLS AND FIXTURES

BELT USERS . . . .

HEED THIS!

. . . Approximately 85% of all SAHARA and REXALL users have been on our books over 15 years . . .

Many since 1912 . . .

Some since 1910!

If you operate belting for handling hot or cold sand, castings, etc., it will benefit you to ascertain WHY OUR CUSTOMERS STICK, so let us send you the records to compare.

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CLEVELAND Patented COIL HEAD CHAPLET

SAND PACKS AROUND IT
***Definitely* BETTER**

The holding power due to unusual design and quality is gaining wide recognition in foundries producing automotive, stove and numerous similar castings.

We also make Square Head, Radiator Chaplets, Stem and Double Head Chaplets of proven dependability.

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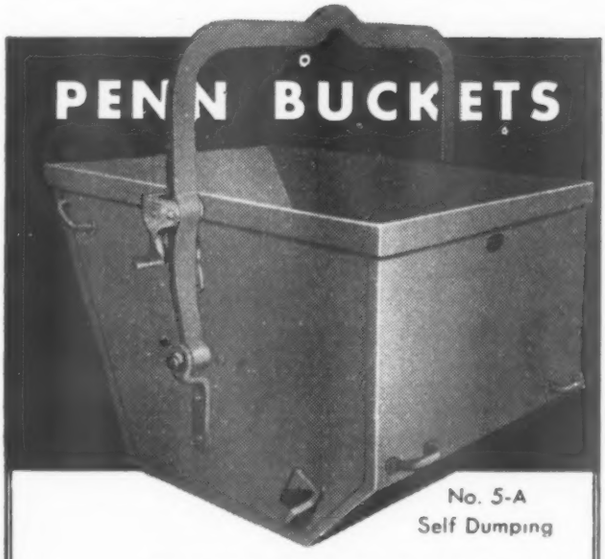

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only surface-deep . . yet may cause
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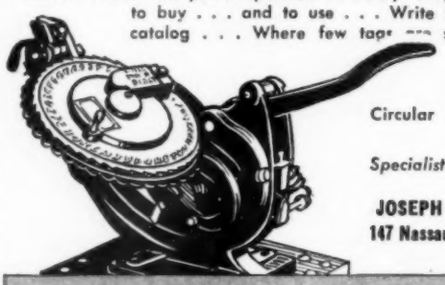

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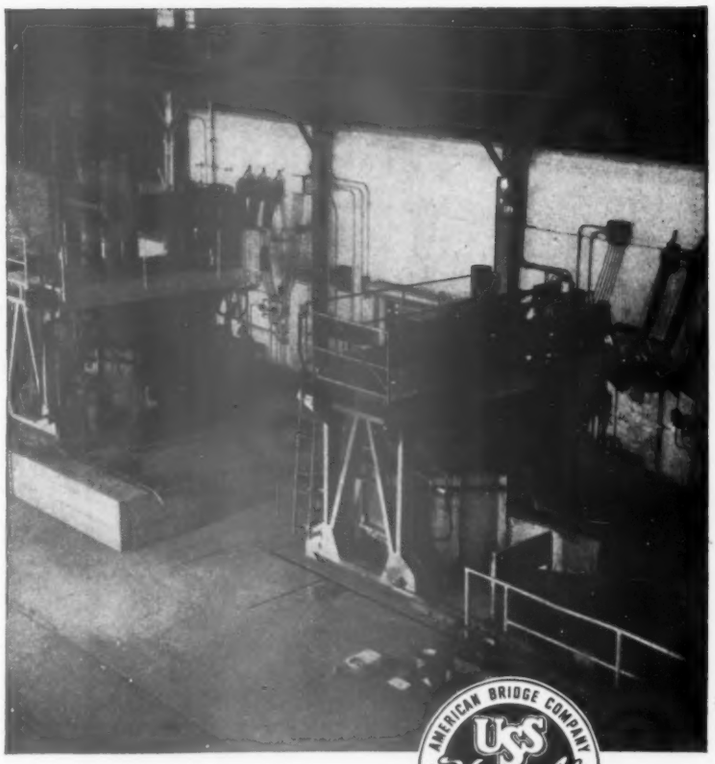

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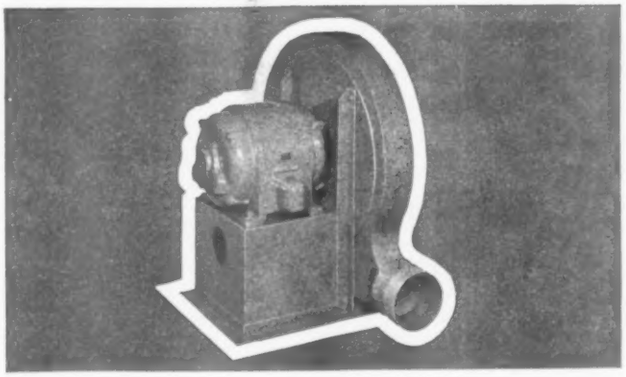

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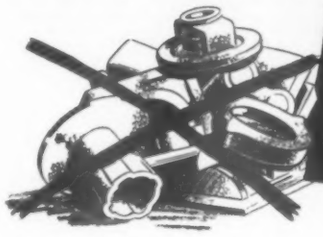

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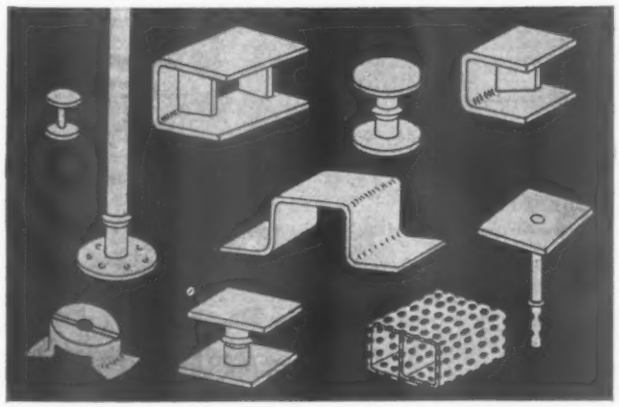

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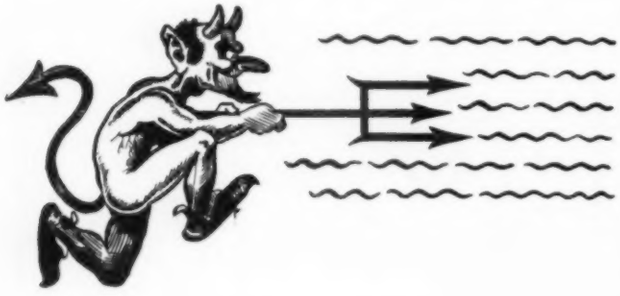
(PATENTS PENDING)

for Ferrous and Non-Ferrous Metals



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THERMOTOMIC is a new exothermic feeding compound which generates 3500 B.T.U. per pound. Its use assures reduced size of feeding heads or risers, substantially lowered cleaning costs of castings, as well as a reduction in scrap losses. THERMOTOMIC is produced in powder form only. It can be molded into feeding ring cores or inserts of any desired shape by the same method as sand cores. No special equipment is required for its use. THERMOTOMIC raises the temperature of the metal where it is applied as feeding rings or inserts under the feeding heads permitting better feeding of the metal into the mold and retarding solidification in those portions of the castings where rapid cooling may cause piping, shrinkage or segregation. THERMOTOMIC can also be used as a facing application where it is desired to maintain fluidity of the casting metal. THERMOTOMIC is past the experimental stage in its many applications with scores of nationally known foundries using it regularly as standard practice in the production of ferrous and non-ferrous castings.

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Both THERMOTOMIC and NO. 5 CARBON FREE LIQUIDIZER are packed in 100 lb. drums and in 500 lb. barrels with full instructions for their use enclosed.

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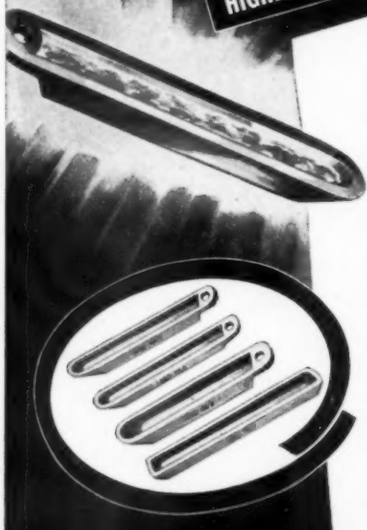

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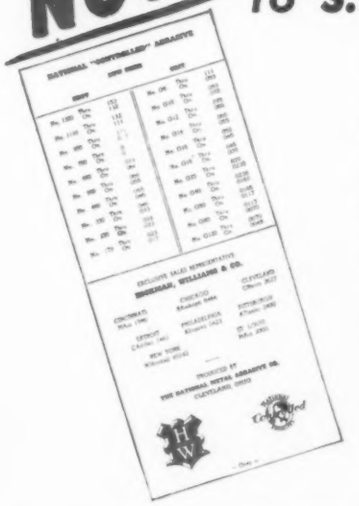

New convenience in specifying and using—that's the big advantage for "National" users in the new S.A.E. gradings. And National Abrasives conform rigidly to those specifications. The quality, uniformity, low cost and long life of "National" remains the same as you have always known. It provides the better, faster, cleaning you need to meet today's conditions. For castings, forgings, heat treated parts, plates, stampings, sheets etc., specify "National Controlled Abrasive." Applicable to iron, steel, bronze, brass and aluminum.

PROMPT DELIVERY

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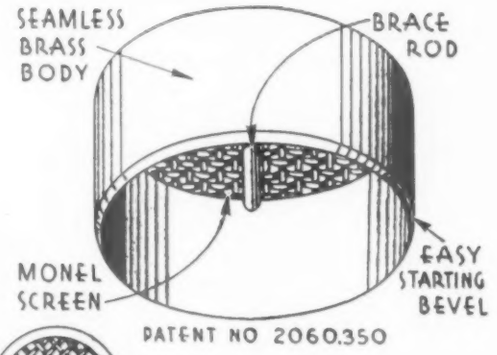

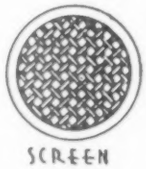

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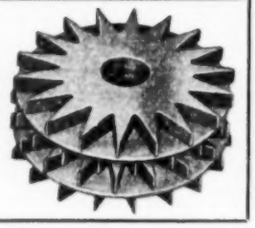

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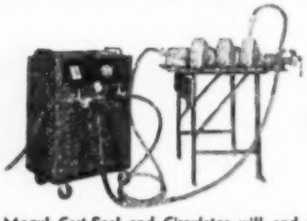

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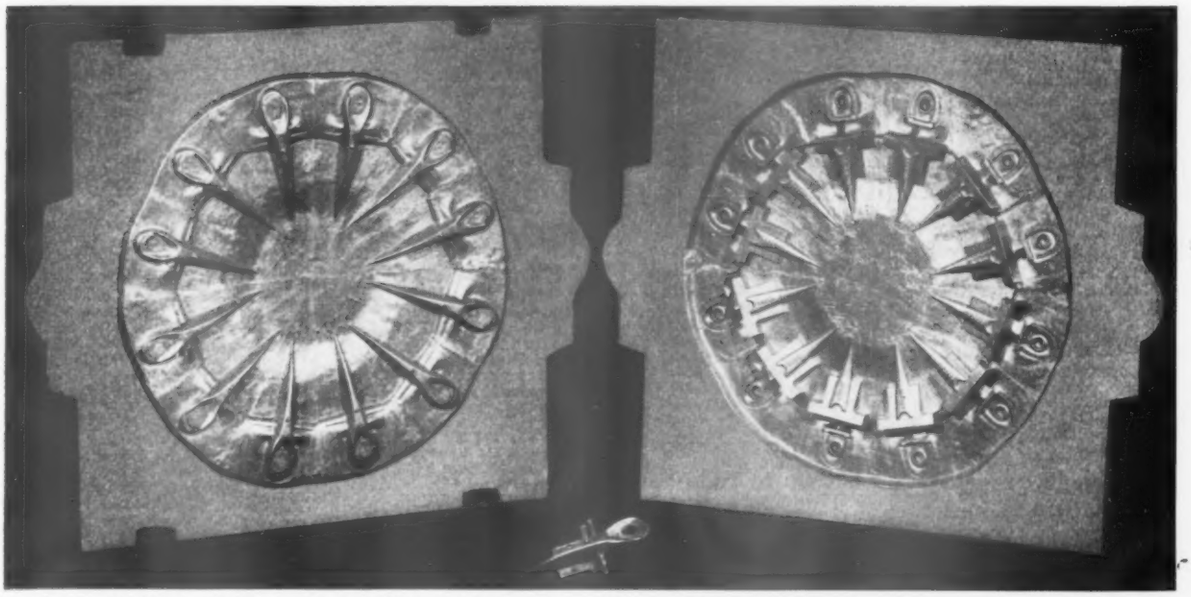

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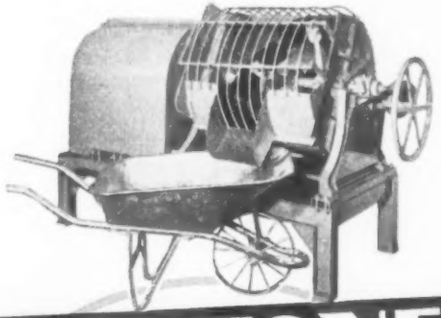

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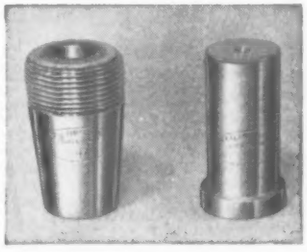

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Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland 13, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Velsicol Corp., 120 E. Pearson St., Chicago 11, Ill.

CORE BREAKERS

Cleveland Pneumatic Tool Co., 3781 E. 77th St. Cleveland 5, O.

CORE DRAWER

Freeman Supply Co., Toledo 5, O.

CORE GRINDERS (Power Operated)

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.

CORE KNOCKOUT MACHINES

Beardsley & Piper Co., The 2541 N. Keeler Ave., Chicago 39. Ill.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

CORE MAKING MACHINES

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Malwaukee Foundry Equipment Co., 3228 W. Pierce St., Milwaukee 4, Wis.
Redford Iron & Equipment Co., 21315 W. McNichols Rd., Detroit, Mich.

CORE OIL

Buckeye Products Co., 7022 Vine St., Cincinnati 16, O.
Certified Core Oil & Mfg. Co., 3308 So. Cicero Ave., Chicago 50, Ill.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Delta Oil Products Co., Milwaukee 9, Wis.
Gamlen Chemical Co., 1469 Spring Garden Ave., Pittsburgh 12, Pa.
Hoffman Foundry Supply Co., 1193 Main St., Cleveland. O.
Houghton Co., E. F., Philadelphia, Pa.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Velsicol Corp., 120 E. Pearson St., Chicago 11, Ill.

CORE OVENS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Despatch Oven Co., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
Foundry Equipment Co., Cleveland 13, O.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Maehler, Paul. Co., 2200 W. Lake St., Chicago 12, Ill.
Mahon, R. C. Co., 8650 Mt. Elliott Ave., Detroit 11, Mich.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.
Ross, J. O., Engineering Corp., 350 Madison Ave., New York 17, N. Y.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

CORE PASTE

Corn Products Sales Co., 17 Battery Pl., New York 4, N. Y.
Dayton Oil Co., Dayton, O.
Delta Oil Products Co., Milwaukee 9. Wis.
Eastern Clay Products Co., Eifort, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

CORE PLATES (Steel, Asbestos)

Diamond Clamp & Flask Co., Richmond, Ind.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.

CORE PLATES (Steel, Asbestos) (cont'd)

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Youngstown 1, O.

CORE RODS

Bethlehem Steel Co., Bethlehem, Pa.

CORE RODS (Carbon, Graphite)

National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

CORE ROD STRAIGHTENING and CUTTING MACHINERY

American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Kane & Roach, Syracuse, N. Y.

CORE SAND

Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.

CORE SAND MIXERS

American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 30, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington St., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Corp., Waterloo, Iowa.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Rover Foundry & Machine Co., Kingston, Pa.

CORE SPRAYERS

Freeman Supply Co., 1152 Broadway, Toledo 5, O.

CORE TRAYS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

CORE TRUCKS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.

CORE VENTS

Demmler, Wm., & Bros., Kewanee, Ill.
PMS Co., 1701 Power Ave., Cleveland 14, O.
Rienacker Industries, 2035 Hilton Rd., Ferndale, Mich.
Sinel Co., 1405 Philadelphia Drive, Dayton 6, O.
Smillie, C. M., & Co., 1100 Woodward Hgts. Blvd. Ferndale, Mich.
United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

CORE WASH

Asbury Graphite Mills, Asbury, N. J.
Bloomsbury Graphite Co., Bloomsbury, N. J.
Carborundum Co., Perth Amboy, N. J.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York City 4.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71 St., Cleveland 5, O.
Houghton Co., E. F., 303 West Lehigh Ave., Philadelphia 33, Pa.
National Carbon Co. Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24. Pa.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland 13, O.
Stevens, Frederic B., Inc., Detroit 26. Mich.
United Oil Mfg. Co., 1429 Walnut St., Erie. Pa.
United States Graphite Co., Saginaw, Mich.

CORE WIRE CUTTERS

Federal Foundry Supply Co., 4600 E. 71st., Cleveland 5, O.

CORE WIRE STRAIGHTENERS
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st., Cleveland 5, O.

CORES (Annealing)
Pressed Steel Co., Wilkes-Barre, Pa.

CORES (Ceramic)
American Lava Corp., Chattanooga, Tenn.

COUPLINGS (Flexible)
Ajax Flexible Coupling Co., Westfield, N. Y.

CRANES (Bucket)
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANE CONTROL (Electric)
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CRANE LUBRICATING SYSTEMS
Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

CRANES (Electric Traveling)
American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div., of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Erie Steel Construction Co., Erie, Pa.
Forker Corp. Div. of Ohio Tramrail, 1826 East 47th St., Cleveland, Ohio.
Northern Engineering Works, 2615 Atwater, Detroit, Mich.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.
Wright Mfg. Div., American Chain & Cable Co., York, Pa.

CRANES (Gantry)
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Forker Corp. Div. of Ohio Tramrail, 1826 East 47th St., Cleveland, Ohio.
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater, Detroit, Mich.
Wellman Engineering Co., 7000 Central Ave., Cleveland 4, O.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Hand Traveling)
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.

CRANES (Hand Traveling)
Forker Corp. Div. of Ohio Tramrail, 1826 East 47th St., Cleveland, Ohio
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater, Detroit, Mich.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., 3960 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Jib)
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio
Forker Corp. Div. of Ohio Tramrail, 1826 East 47th St., Cleveland, Ohio
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CRANES (Monorail)
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.

CRANES (Monorail) (cont'd)
Forker Corp. Div. of Ohio Tramrail, 1826 East 47th St., Cleveland, Ohio
Modern Equipment Co., Port Washington, Wis.
Northern Engineering Works, 2615 Atwater, Detroit, Mich.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.

CRANES (Self-Propelled)
Hughes-Keenan Co., Mansfield, Ohio

CRUCIBLES
American Crucible Co., Shelton, Conn.
Electro Refractories & Alloys Corp. Vars Bldg., Buffalo 2, N. Y.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co., Pittsburgh, Pa.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

CRUCIBLE FURNACES
Ajax Electrothermic Corp., Trenton, N. J.
Campbell-Hausfeld Co., Harrison, O.
Fisher Furnace Co., 5525 N. Wolcott Ave., Chicago 40, Ill.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.

CRUCIBLE LIFTERS
Modern Equipment Co., Port Washington, Wis.

CRUCIBLE POURING DEVICES
Modern Equipment Co., Port Washington, Wis.

CUPOLAS
Modern Equipment Co., Port Washington, Wis.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA BLOWERS
Roots-Connersville Blower Corp., Connersville, Ind.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CHARGING MACHINES
American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA CONTROL EQUIPMENT
Carman, Edwin S., Lee Rd., at Mayfield, Cleveland 18, O.
Foxboro Company, Foxboro, Mass.

CUPOLA DUST ARRESTORS
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

CUPOLA LININGS
Carborundum Co., Perth Amboy, N. J.
Cleveland Quarries Co., Guildhall Bldg., Cleveland 15, O.
Ironton Fire Brick Co., Ironton, O.
Nock and Sons Co., 1243 East 55th St., Cleveland 14, Ohio
United States Graphite Co., Saginaw, Mich.

CUPOLA SPARK ARRESTORS
Whiting Corp., 15607 Lathrop Ave., Chicago, Ill.

CUTOFF MACHINES (Abrasive)
Clipper Mfg. Co., 4030 Manchester, St. Louis, Mo.
Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

CUTTING OILS
Houghton Co., E. F., 303 West Lehigh Ave., Philadelphia 33, Pa.

DARK ROOM ACCESSORIES (X-Ray)
Eastman Kodak Co., Rochester, N. Y.

DARK ROOM PROCESSING (Chemical Tanks, etc.)
Eastman Kodak Co., Rochester, N. Y.

DEGASIFIERS
American-British Chemical Inc., 180 Madison Ave., New York 16.
Foundry Services, Inc., 280 Madison Ave., New York 16, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, N. Y.

DEOXIDIZERS
Ajax Metal Co., 46 Richmond St., Philadelphia 23, Pa.
American Smelting & Refining Co., 120 Broadway, New York 5.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, N. Y.

DESULPHURIZERS
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Hercules Powder Co., 999 Market St., Wilmington 99, Del.
Mathieson Alkali Works, Inc., 60 E. 42nd St., New York 17, N. Y.
Modern Equipment Co., Port Washington, Wis.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DIES
Acme Aluminum Alloys Inc. 232 N. Findlay St., Dayton 3, O.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.

DOWEL PINS
Standard Horse Nail Corp., New Brighton, Pa.

DOWELS (Metal Adjustable)
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.

DRILLS (Electric)
Standard Electrical Tool Co., 2488 River Rd., Cincinnati 4, O.

DRILLS (Pneumatic)
Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland 5, Ohio
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Schrammn Inc., West Chester, Pa.

DRILL PRESSES
Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis.

DRIVES (Reciprocating)
Ajax Flexible Coupling Co., Westfield, N. Y.

DRUMS (Magnetic)
Dings Magnetic Separator Co., 512 E. Smith St., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

DUMP BODIES
Brooks Equipment & Mfg. Co., 1402 Davenport Rd., Knoxville 8, Tenn.

DUMP HOPPERS
Buda Company, Harvey, Ill.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

DUST ARRESTING EQUIPMENT
American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Buell Engineering Co., 14 Cedar St., New York 5, N. Y.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Mahon, R. C., Co., 8650 Mt. Elliott Ave., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland 4, O.
Ruemelin Mfg. Co., 3850 N. Palmer St., Milwaukee 12, Wis.
Schneible Co., Claude B., 2827-25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

DUST COLLECTORS
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.

DUST RECOVERY SYSTEMS
American Foundry Equipment Co., Mishawaka, Ind.
Buell Engineering Co., 14 Cedar St., New York City 5.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

ELECTRIC FURNACES (See Furnaces, Electric)

ELECTRODES (Graphite and Amorphous)
International Graphite & Electrode Corp., St. Marys, Pa.
National Carbon Co., Inc., Electrode Sales Div., 30 E. 42nd St., New York 17, N. Y.

ELEVATORS
Standard Conveyor Co., North St. Paul 9, Minn.

ELEVATORS (Bucket)
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

ELEVATORS (Material Handling)
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

ELEVATORS (Pneumatic, Material Handling)
Fuller Company, Catasaqua, Pa.

EMBOSSING MACHINES (Metal Labels)
Roovers Brothers, Inc., 3611 14th Ave., Brooklyn, N. Y.

ENGINEERING SERVICE (Foundry)
Associated Engineers Inc., 230 E. Berry St., Fort Wayne 2, Ind.
Carman, Edwin S., Lee Rd. at Mayfield, Cleveland 18, O.
Coffey Engineering Co., 308 Park Ave., Plainfield, N. J.
Conover Engineering Co., 1740 East 12th St., Cleveland 14, O.
Emerson Engineers, The, 30 Rockefeller Plaza, New York, N. Y.
Chas. C. Kawin Co., 431 S. Dearborn St., Chicago 5, Ill
Leighton M. Long & Associates, 604 Nicholas Bldg., Toledo, O.
Lester B. Knight & Associates, 120 So. LaSalle St., Chicago 3, Ill.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
Reichert, W. G., Engineering Co., 1060 Broad St., Newark, N. J.
E. R. Steinmann & Associates, 1 DeKalb Ave., Brooklyn 1, N. Y.
Wickland Co., A. A., 205 W. Wacker Dr., Chicago 6, Ill.

EXHAUST SYSTEMS
American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.

EXHAUST SYSTEMS (cont'd)
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Pangborn Corporation, Hagerstown, Md.
Parsons Engineering Corp., Cleveland 4, O.
Propellair Inc., Springfield, O.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

FABRICATORS (Metal)
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

FACINGS
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St. New York 17, N. Y.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis St., Philadelphia 24, Pa.
Stevens Inc., Frederic B., Detroit 26, Mich.
United States Graphite Co., Saginaw, Mich.

FANS (Ventilating, Exhaust, Cooling, etc.)
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
General Blower Co., 406 N. Peoria St., Chicago 22, Ill.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Propellair Inc., Springfield, O.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.

FEEDERS (Rotary)
Fuller Company, Catasaqua, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

FEEDERS (Sand)
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

FERROBORON
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROCHROME
Hickman-Williams & Co., Cleveland, O.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROMANGANESE
Bethlehem Steel Co., Bethlehem, Pa.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, O.

FERROMOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., New York 18, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

FERROSILICON
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Globe Iron Co., Jackson, Ohio.
Jackson Iron & Steel Co., Jackson, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro-Alloys Corp., Canton 2, O.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTITANIUM
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FERROTUNGSTEN
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

FILLET (Cement & Solvant)
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.

FILLET (Wax, leather, wood)
PMS Co., 1701 Power Ave., Cleveland 14, O.

FILM (X-Ray)
Eastman Kodak Co., Rochester, N. Y.

FILTERS (Air)
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.

FIRE BRICK
Carborundum Co., Perth Amboy, N. J.
Chicago Retort & Firebrick Co., 208 So. LaSalle St., Chicago 4, Ill.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Norton Co., Worcester 6, Mass.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis St., Philadelphia 24, Pa.
Stevens Inc., Frederic B., Detroit 26, Mich.

FIRE CLAY
Eastern Clay Products, Inc., Eifort, O.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.

FIRE SAND
Carborundum Co., Niagara Falls, N. Y.
Cleveland Quarries Co., Guildhall Bldg., Cleveland 15, O.

FIRESTONE
Cleveland Quarries Co., Guildhall Bldg., Cleveland 15, O.

FLASK BANDS
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

FLASKS (Aluminum)
Adams Co., Dubuque, Iowa
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

FLASKS (Dowmetal)
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

FLASK FILLERS
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.

FLASKS (Slip)
Adams Co., Dubuque, Iowa
Fremont Flask Co., Fremont, O.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.

FLASKS (Snap)
Adams Co., Dubuque, Iowa
Arcade Manufacturing Div. Rockwell Mfg. Co., Freeport, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Stevens, Inc., Frederic B., Detroit 26, Mich.

FLASKS (Steel)
Black-Sivalls & Bryson Inc., Kansas City, Mo.
Industrial Fabricating, Inc., 817 Hall St., Eaton Rapids, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Truscon Steel Co., Youngstown 1, O.

FLASK FITTINGS
Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Truscon Steel Co., Youngstown 1, O.

FLASK LUMBER
Dougherty Lumber Co., 4300 E. 66th St., Cleveland 5, O.

FLASKS (Wood)
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

FLEXIBLE SHAFT MACHINERY
Mall Tool Co., 7720 South Chicago Ave., Chicago 19, Ill.
Strand Co., N. A., 5001 N. Wolcott Ave., Chicago 40, Ill.
Wyzenbeek & Staff Inc., 838 W. Hubbard St., Chicago, Ill.

FLOORING (Non-Slip)
Norton Co., Worcester 6, Mass.

FLUXES
American British Chemical Inc., 180 Madison Ave., New York 16.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Foundry Services, Inc., 280 Madison Ave., New York 16, N. Y.
Mathieson Alkali Works, Inc., 60 E. 42nd St., New York 17, N. Y.
National Pigment Co., East York St., Philadelphia, Pa.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, N. Y.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

FOUNDRY LAYOUT & METHODS
Associated Engineers Inc., 230 E. Berry St., Fort Wayne 2, Ind.
Lester B. Knight & Associates, 120 So. LaSalle St., Chicago 3, Ill.

FOUNDRY NAILS
Capewell Mfg. Co., Hartford, Conn.
Standard Horse Nail Corp., New Brighton, Pa.

FOUNDRY SHOVELS
(See SHOVELS)

FOUNDRY SUPPLY HOUSES
Buckeye Products Co., 7022 Vine St., Cincinnati 16, Ohio.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Eastern Clay Products, Inc., Eifort, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, O.
Hoffman Foundry Supply Co., 1193 Main St., Cleveland, Ohio.
Midwest Foundry Supply Co., Edwardsville, Ill.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis St., Philadelphia 24, Pa.
Stevens, Inc., Frederic B., Detroit 26, Mich.

FURNACES (Aluminum & Magnesium Billets)
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Loftus Engineering Corp., 610 Smithfield St., Pittsburgh 22, Pa.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.

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Despatch Oven Co., Minneapolis 14, Minn.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Kirk-Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
W. S. Rockwell Co., 56 Church St., New York 17, N. Y.

FURNACES (Aluminum Melting)
Ajax Engineering Corp., Trenton, N. J.

FURNACES (Aluminum Melting) (cont'd)
Campbell-Hausfeld Co., Harrison, O.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Romph Furnace Co., 1230 Benjamin S.E., Grand Rapids, Mich.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

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Ajax Electric Co., Inc., Philadelphia 23, Pa.
Despatch Oven Co., Minneapolis 14, Minn.

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Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
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Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lindberg Engineering Co., 2448 West Hubbard, Chicago 12, Ill
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Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
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Ajax Metal Co., Philadelphia 23, Pa.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Eclipse Fuel Engrg. Co., 711 So. Main St., Rockford, Ill.
Fen Machine Co., 1350 Babbitt Rd., Cleveland 17, Ohio.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Johnston Mfg. Co., Minneapolis 13, Minn.
Radiant Combustion Inc. Warren, Ohio.
W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.

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Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

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Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Fen Machine Co., 1350 Babbitt Rd., Cleveland 17, Ohio.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
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Romph Furnace Co., 1230 Benjamin S.E., Grand Rapids, Mich.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago 6, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

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American Bridge Co., Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
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Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Eclipse Fuel Engineering Co., 711 So. Main St., Rockford, Ill.
Electric Furnace Co., W. Wilson St., Salem, Ohio.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., 2448 West Hubbard, Chicago 12, Ill.
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Maehler, Paul, Co., 2200 W. Lake St., Chicago 12, Ill.
Radiant Combustion Inc., Warren, Ohio.
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Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

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Ajax Engineering Corp., Trenton, N. J.
Ajax Metal Co., Philadelphia 23, Pa.
Bellevue Industrial Furnace Co., 2975 Bellevue Ave., Detroit 7, Mich.
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Johnston Mfg. Co., Minneapolis 13, Minn.
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Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Moline Iron Works, 228 Second St., Moline, Ill.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Pioneer Mfg. Co., West Allis, Wis.
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Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
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Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
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S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

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International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.

MOLDING MACHINES (Squeeze)

Acme Aluminum Alloys Inc., 232 N. Findlay St., Dayton 3, O.
Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21, Mich.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland 14, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Moline Iron Works, 228 Second St., Moline, Ill.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
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MOLDING SANDS

Ottawa Silica Co., Ottawa, Ill.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.

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National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
United States Graphite Co., Saginaw, Mich.

MOLDS (Centrifugal, Graphite)

National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

MOLYBDENUM

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Forker Corp. Div. of Ohio Tramrail, 1826 East 47th St., Cleveland, Ohio.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

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Allis-Chalmers Mfg. Co., 1128 S. 70th St., Milwaukee 1, Wis.
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Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.

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Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 300 W. Adams St., Chicago 6, Ill.
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Buehler, Ltd., 228 N. LaSalle St., Chicago 1, Ill.

OVENS (Annealing and Heat Treating)

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Despatch Oven Co., Minneapolis 14, Minn.
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Foundry Equipment Co., Cleveland 13, O.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Lindberg Engineering Co., 2448 West Hubbard, Chicago 12, Ill.
Maehler, Paul, Co., 2200 W. Lake St., Chicago 12, Ill.
Ross, J. O. Engineering Corp., 350 Madison Ave., New York 17.

OVENS (Annealing and Heat Treating) (cont'd)

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.
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Despatch Oven Co., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Industrial Oven Engineering Co., 11621 Detroit Ave., Cleveland, O.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Maehler, Paul, Co., 2200 W. Lake St., Chicago 12, Ill.
Mahon, R. C., Co., 8650 Mt. Elliott Ave., Detroit 11, Mich.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.
Young Brothers Co., 6508 Mack Ave., Detroit 7, Mich.

OVENS (Mold)

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Detroit Sheet Metal Works, 1300 Oakman Blvd., Detroit, Mich.
Gehnrich Oven Div., W. S. Rockwell Co., 56 Church St., New York 7, N. Y.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.
Ross, J. O., Engineering Corp., 350 Madison Ave., New York 17, N. Y.

OXYGEN

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.

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Delta Oil Products Co., Milwaukee 9, Wis.
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Smith Facing & Supply Co., 1857Carter Rd., Cleveland 13, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

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BRAY Corp., 2961 E. Colorado St., Pasadena 8, Calif.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.
McDougall-Butler Co., 24 Evans St., Buffalo 2, N. Y.
PMS Co., 1701 Power Ave., Cleveland 14, O.

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Freeman Supply Co., Toledo 5, O.
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Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio

PATTERN PLASTER

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Acme Aluminum Alloys Inc., 232 N. Findlay St., Dayton 3, O.
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PATTERN PLATES (cont'd)

Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
Marathon Chemical Co., Div., Marathon Corp., Rothschild, Wis.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3, O.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, Ohio.

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Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.
Strand, N. A., Co., 5001 Wolcott Ave., Chicago 40, Ill.
Wellman Products Co., 1444 E. 49th St., Cleveland 3, Ohio.

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Acme Aluminum Alloys Inc., 232 N. Findlay St., Dayton 3, O.
Buffalo Pattern Works, 830 Hertel Ave., Buffalo, N. Y.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit 11, Mich.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.
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Bethlehem Steel Co., Bethlehem, Pa.
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Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
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PLASTER OF PARIS

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Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

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Frederic B. Stevens, Inc., Detroit 26, Mich.
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Keller Tool Co., Grand Haven, Mich.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
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International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Milwaukee Foundry Equipment Co., 8258 W. Pierce St., Milwaukee 4, Wis.

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Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Claude S. Gordon Co., 3000 So. Wallace, Chicago 9, Ill.
Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.
Pyrometer Instrument Co., 106 Lafayette St., New York 13.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

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Carborundum Co., Perth Amboy, N. J.
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Eastern Clay Products, Inc., Eifort, O.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
Ironton Fire Brick Co., Ironton, O.
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United States Graphite Co., Saginaw, Mich.

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RISER RODS (Graphite)

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RODS (Steel)

Republic Steel Corp., Cleveland 4, O.

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Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
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Midwest Foundry Supply Co., Edwardsville, Ill.
Ottawa Silica Co., Ottawa, Ill.
Pangborn Corp., Hagerstown, Md.
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Pangborn Corp., Hagerstown, Md.

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Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.

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Norton Company, Worcester 6, Mass.
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Sly, W. W., Mfg. Co., 4753 Train Ave., Cleveland 2, O.

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Ruemelin Mfg. Co., 3850 N. Palmer St., Milwaukee 12, Wis.
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National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND CONVEYING and HANDLING EQUIPMENT

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.
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National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Penn Iron Works, Reading, Pa.
Royer Foundry & Machine Co., Kingston, Pa.

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Ajax Flexible Coupling Co., Westfield, N. Y.
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.
Fuller Company, Catasaqua, Pa.
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Robins Conveyors Inc., 70 Pine St., New York 5, N. Y.

SAND DRYERS

Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee 1, Wis.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
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Delta Mfg. Co., Industrial Division, 620 E. Vienna Ave., Milwaukee 1, Wis.
Oliver Machinery Company, Grand Rapids 2, Mich.

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Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis.

SAND MEASURING and WEIGHING DEVICES

Baker Perkins Inc., Saginaw, Mich.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

SAND MIXERS

American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Beardsley & Piper Co., The, 2451 N. Keeler Ave., Chicago 39, Ill.

SAND MIXERS (cont'd)

Blystone Division Standard Sand & Machine Co., 549 W. Washington Blvd., Chicago 6, Ill.
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Construction Machinery Corp., Waterloo, Iowa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

SAND PREPARATION EQUIPMENT

Ajax Flexible Coupling Co., Westfield, N. Y.
Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee 1, Wis.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Baker Perkins Inc., Saginaw, Mich.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.
Grimes Molding Machine Co., 1429 Virginia Park, Detroit 6, Mich.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Royer Foundry & Machine Co., Kingston, Pa.
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Simplicity Engineering Co., Durand, Mich.

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Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland 5, Ohio.
Dayton Pneumatic Tool Co., Dayton 1, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Keller Tool Co., Grand Haven, Mich.

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Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
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National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Nichols Engineering & Research Corp., 60 Wall Tower, New York 5, N. Y.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

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Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee 1, Wis.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kansas.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.
Screen Equipment Co., Buffalo, N. Y.

SAND SIFTING and SCREENING MACHINERY (cont'd)

Simplicity Engineering Co., Durand, Mich.
Pangborn Corp., Hagerstown, Md.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

SAND STORAGE BINS & GATES

Bartlett & Snow, C. O., Co. 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Neff & Fry Co., Camden, O.

SAWS (Band, Metal, Wood)

Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis.
Oliver Machinery Company, Grand Rapids 2, Mich.

SAWS (Cold Metal)

Bethlehem Steel Co., Bethlehem, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

SAWS (Masonry)

Clipper Mfg. Co., 4030 Manchester, St. Louis, Mo.

SCALING HAMMERS

Dayton Pneumatic Tool Co., Dayton 1, O.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Keller Tool Company, Grand Haven, Mich.
Schramm, Inc., West Chester, Pa.

SCREENS (Shake-Out)

Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee 1, Wis.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Screen Equipment Co., Buffalo, N. Y.
Simplicity Engineering Co., Durand, Mich.

SCREENS (Vibrating)

Ajax Flexible Coupling Co., Westfield, N. Y.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Robins Conveyors, Inc., 70 Pine St., New York 5, N. Y.
Screen Equipment Co., Buffalo, N. Y.

SEA COAL

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland 13, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.
Midwest Foundry Supply Co., Edwardsville, Ill.

SEALERS (Castings)

Kerkling & Co., Burbank, Calif.

SEPARATORS (Abrasive)

American Foundry Equipment Co., 5505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

SEPARATORS (Air, Moisture, Oil)

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
American Foundry Equipment Co. 505 S. Byrkit St., Mishawaka, Ind.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Johnson Corporation, Three Rivers, Mich.
Jas. A. Murphy & Co., Hamilton, O.
Pangborn Corp., Hagerstown, Md.

SEPARATORS (Magnetic)

Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.

SEPARATORS (Magnetic) (cont'd)

Dings Magnetic Mfg. Co., E. Smith St., Milwaukee 7, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

SHAKE-OUT MACHINERY

Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee 1, Wis.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.
Robins Conveyors, Inc., 70 Pine St., New York 5, N. Y.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.

SHOT AND GRIT

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
American Steel Abrasives Co., Galion, O.
Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Cleveland Metal Abrasives Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, O.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Pangborn Corp., Hagerstown, Md.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Steel Shot & Grit Co. Inc., 39 Warren Ave., Boston, Mass.
Western Metal Abrasive Co., 2545 East 79th St., Cleveland 4, Ohio.

SHOT (Peening)

Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Steel Abrasives Co., Galion, O.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
Steel Shot & Grit Co., Inc., 39 Warren Ave., Boston, Mass.
Western Metal Abrasive Co., 2545 E. 79th St., Cleveland 4, O.

SHOVELS

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 26, Mich.

SHOVELS (Power)

Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

SILICA FLOUR

Ottawa Silica Co., Ottawa, Ill.
Standard Silica Corp., 209 So. LaSalle St., Chicago 4, Ill.

SILICON (Briquets)

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

SILICON CARBIDE (Briquets)

Carborundum Co., Perth Amboy, N. J.

SILVERY PIG IRON see Pig Iron (Silvery)

SKIMMER BARS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

SKIMMERS

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

SKIP HOISTS

Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill

SLIP FLASKS

Adams Co., Dubuque, Iowa.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

SLIP JACKETS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

SMELTERS & REFINERS

American Smelting & Refining Co., 120 Broadway, New York 5.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo 17, N. Y.

SNAGGING WHEELS—See ABRASIVE WHEELS

SNAP FLASKS

Adams Co., Dubuque, Iowa.
Hines Flask Co., 1324 Hird Ave., Cleveland 7, O.

SODA ASH

Hercules Powder Co., 999 Market St., Wilmington 99, Del.
Mathieson Alkali Works, Inc., 60 E. 42nd St., New York 17, N. Y.

SOLDER

American Smelting & Refining Co., 120 Broadway, New York 5.

SPECIAL FOUNDRY ALLOYS

Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

SPIEGELEISEN

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York 17, N. Y.

SPRAY GUNS

Murphy & Co., Jas. A., Hamilton, O.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

SPRUE CUTTERS

Adams Co., Dubuque, Iowa
Freeman Supply Co., Toledo 5, O.
Milwaukee Chaplet & Mfg. Co., 1025 S. 40th St., Milwaukee, Wis.

STEEL (High Speed)

Bethlehem Steel Co., Bethlehem, Pa.

STEEL (Structural)

American Bridge Co., Pittsburgh 19, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

STORAGE BATTERIES (Industrial)

Philco Storage Battery Div., Philco Corporation, Trenton, N. J.

—When writing advertisers, please mention THE FOUNDRY—

STRIPPING MACHINES

Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
International Molding Machine Co., 2608 W. 16th St., Chicago 8, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

SURFACE TREATMENT METALS

N. Ransohoff, Inc., 208 W. 71st St., Cincinnati 16, O.

TAPER PINS

Standard Horse Nail Corp., New Brighton, Pa.

TEMPERATURE CONTROLLERS

Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane Columbus 1, O.

TESTING LABORATORIES

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Chas. C. Kawin Co., 431 S. Dearborn St., Chicago 5, Ill.

TESTING (Non Destructive)

Magnaflux Corporation, 5910 Northwest Highway, Chicago 31, Ill.

THERMOCOUPLES

Illinois Testing Laboratories, 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.
Tamms Silica Co., 228 N. LaSalle St., Chicago 1, Ill.

TIERING MACHINES (Power)

Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

TIMERS (Electric)

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

TIN

American Smelting & Refining Co. 120 Broadway, New York 5, N. Y.

TONGS

Industrial Equipment Co., Minster, O.

TOOLS (Pneumatic Portable)

Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York 17, N. Y.
Cleveland Pneumatic Tool Co., 3781 E. 77th St., Cleveland 5, Ohio.
Dayton Pneumatic Tool Co., Dayton 1, O.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Keller Tool Co., Grand Haven, Mich.
Schramm Inc., West Chester, Pa.

TORCHES and BURNERS (Acetylene, gas, oil)

Freeman Supply Co., Toledo 5, O.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.
North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

TOTE BOXES

Cleveland Wire Spring Co., United Bank Bldg., Cleveland 9, O.

TRACTORS (Gas Powered)

Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.

TRAMRAIL SYSTEMS

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.

TRAMRAIL SYSTEMS (cont'd)

Forker Corp. Div. of Ohio Tramrail, 1826 East 47th St., Cleveland, Ohio
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Modern Equipment Co., Port Washington, Wis.

TRAPS (Steam)

Johnson Corporation, Three Rivers, Mich.

TROLLEYS

Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis 20, Mo.
Modern Equipment Co., Port Washington, Wis.

TRUCK BATTERIES (Industrial)

Philco Storage Battery Div., Philco Corporation, Trenton, N. J.

TRUCK CRANES

Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland, O.
Hughes-Keenan Co., Mansfield, Ohio

TRUCKS (Electric-Industrial)

Automatic Transportation Co., 121 West 87th St., Chicago 20, Ill.
Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland, O.
Lift Trucks Inc., 2425 Spring Grove Ave., Cincinnati 14, Ohio

TRUCKS (Industrial)

Buda Company, Harvey, Ill.
Lift Trucks Inc., 2425 Spring Grove Ave., Cincinnati 14, Ohio.

TRUCKS (Motorized Hand Lift)

Automatic Transportation Co., 121 West 87th St., Chicago 20, Ill.

TRUCKS (Power Lift)

Automatic Transportation Co., 121 West 87th St., Chicago 20, Ill.
Clark Tructractor Div. of Clark Equipment Co., Battle Creek, Mich.
Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland, Ohio.
Lift Trucks Inc., 2425 Spring Grove Ave., Cincinnati 14, Ohio.

TRUCK WHEELS

Bethlehem Steel Co., Bethlehem, Pa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

TUBES (Annealing)

Pressed Steel Co., Wilkes-Barre, Pa.

TUMBLING BARRELS

Cleveland Chaplet & Mfg. Co., 1197 West 67th St., Cleveland 2, O.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo 21 Mich.
N. Ransohoff Inc., 208 W. 71st St., Cincinnati 16, O.
Sly Mfg. Co., W. W., 4753 Train Ave., Cleveland 2, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

TURNTABLES

Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Modern Equipment Co., Port Washington, Wis.
Roto-Cast Foundry Equipment Inc., 100 Grand St., Coldwater, Mich.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

UNLOADERS (Portable-Gas Electric)

Cleveland Formgrader Co., 6723 Denison Ave., Cleveland, Ohio

VALVES (Air, Water, Steam)

Air-Way Pump & Equipment Co., 405 S. Jefferson St., Chicago 7, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

VALVES (Adjustable Orifice)

North American Mfg. Co., 2910 E. 75th St., Cleveland 4, O.

VALVES (Blow-off and Cut-off)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, O.
Wm. H. Nicholls Co., Richmond Hill, Long Island 18, N. Y.

VENTILATING SYSTEMS

American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Kirk & Blum Mfg. Co., 2838 Spring Grove Ave., Cincinnati 25, O.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Co., Cleveland 4, O.
Schneible Co., Claude B., 2827—25th St., Detroit 16, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, O.
Sturtevant Co., B. F., Div. of Westinghouse Electric Co., Hyde Park, Boston, Mass.
Swartwout Co., 1851 Euclid Ave., Cleveland 15, Ohio.

VENTILATORS (Roof)

Swartwout Co., 1851 Euclid Ave., Cleveland 15, Ohio.

VENTS (Core Box)

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Demmler & Bros., Wm., Kewanee, Ill.
Reinacker Industries, 2035 Hilton Rd., Ferndale, Mich.
Sinel Co., 1405 Philadelphia Drive, Dayton 6, O.
C. M. Smillie & Co., 1100 Woodward Hgts. Blvd., Ferndale, Mich.

VIBRATORS

Adams Co., Dubuque, Iowa.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago 39, Ill.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Davenport Machine & Foundry Co., Davenport, Iowa.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, O.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Martin Engineering Co., Kewanee, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.
Nicholls Co., Wm. H., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Syntron Company, Homer City, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

VIBRATORS (Core Bench)

Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.

WASH ROOM EQUIPMENT

Bradley Washfountain Co., 2217 W. Michigan St., Milwaukee, Wis.

WAX (Core, Vent, Pattern)

Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.
PMS Co., 1701 Power Ave., Cleveland 14, O.
United Compound Co., Inc., 328 South Park Ave., Buffalo 4, N. Y.

WEDGES (Foundry)

Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WELDING GAS

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

WELDING APPARATUS (Electric Arc)

Metallizing Company of America, 1330 W. Congress St., Chicago 7, Ill.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

WELDING and CUTTING APPARATUS and SUPPLIES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

WELDING ELECTRODES (Carbon)

National Carbon Co., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.

WELDING RODS & ELECTRODES

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Metallizing Company of America, 1330 W. Congress St., Chicago 7, Ill.

WHEELBARROWS

Construction Machinery Corp., Waterloo, Iowa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

WHEELS, ABRASIVE (Cut-off)

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Alloys Corp., Vars Bldg., Buffalo 2, N. Y.
General Grinding Wheel Corp., West Abrasives, Inc., 3132 East Thompson St., Philadelphia, Pa.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Raybestos Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Macklin Co., Jackson, Mich.
Mid West Abrasive Co., Detroit, Mich.
Norton Company, Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, Mich.
Safety Grinding Wheel & Machine Co., Springfield, Ohio.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
Sterling Grinding Wheel Division, Cleveland Quarries Co., Tiffin, Ohio.

WHEELS (Wire)

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE BRUSHES

Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

WIRE NAILS

Bethlehem Steel Co., Bethlehem, Pa.
Republic Steel Corp., Cleveland 4, O.

WOODWORKING MACHINERY

Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee 1, Wis.
Freeman Supply Co., 1152 Broadway, Toledo 5, O.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland 11, Ohio.
Oliver Machinery Co., Grand Rapids 2, Mich.

X-RAY EQUIPMENT

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

X-RAY FILMS

Eastman Kodak Co., Rochester, N. Y.

X-RAY INSPECTION

Magnaflux Corporation, 5910 Northwest Highway, Chicago 41, Ill.

ZINC

American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

Classified Advertising

Help Wanted

STAINLESS STEEL SUPERVISOR

Wanted by established Foundry located in Wisconsin. We are interested in a man who wants a permanent connection, and are prepared to pay a substantial salary. Must be experienced in melting, and the operation of electric direct arc furnace, as well as foundry and molding practice in making stainless steel castings. We have complete chemical and physical laboratory facilities, as well as an efficient supporting organization. Stainless steel division is rapdly developng, and man must be interested in building his organization with it. In your reply, please state education, experience, references, etc. We will pay expenses to Plant for interview.

BOX 715

The FOUNDRY **CLEVELAND 13, OHIO**

DISTRIBUTORS OR
FACTORY REPRESENTATIVES

INCREASE YOUR EARNINGS
RARE OPPORTUNITY

To represent progressive Mid-West manufacturer of quality steel blasting shot and grit, in various parts of the United States. Close factory cooperation, national advertising, field training, substantial commissions. For personal interview give phone.

BOX 602

The FOUNDRY **CLEVELAND 13, OHIO**

FOUNDRY FOREMAN

for

Sand Slinger Floors

Squeezer Molding

Rollover Machine Floors

Must be experienced in Mechanized Grey Iron Foundry operations. State qualifications, salary expected and include photograph in first letter. Plant located in Midwest industrial area.

BOX 717

The FOUNDRY **CLEVELAND 13, OHIO**

TEACHER

Permanent teacher foundry practice in large trade school in Philadelphia district, beginning September first, to teach elementary foundry practice to boys 13 to 14 years old, but occasionally to operate, on a production basis, with older boys, small foundry handling gray iron, brass, bronze and aluminum. Practical experience, some engineering education, good personality, character and capacity to develop are essential. Resident of Phila. area, under forty, preferred. Salary $2,000—$3,000, according to experience. Apply giving full details on age, education, experience, references. **ADDRESS: BOX 697, THE FOUNDRY, CLEVELAND 13, OHIO.**

FOUNDRY FOREMAN

Working foreman to help plan production and operate foundry making permanent mold aluminum alloy castings for automotive parts. Well established company; permanent employment; excellent opportunity for a hustler. Plant located in east San Francisco Bay area. Give particulars, experience and salary desired.

BOX 723

The FOUNDRY **CLEVELAND 13, OHIO**

PRODUCTION FOREMAN

Working foreman to help plan production and operate machine production line finishing permanent mold aluminum alloy castings for automotive parts. Well established company; permanent employment; excellent opportunity for a hustler. Plant located in east San Francisco Bay area. Give particulars, experience and salary desired.

BOX 724

The FOUNDRY **CLEVELAND 13, OHIO**

SALESMAN

Connecticut, Rhode Island & Mass., Foundry Supplies, Equipment, Washes, Compounds. Drawing account against commission. Write fully.

BOX 722

The FOUNDRY **CLEVELAND 13, OHIO**

FOUNDRY SUPERINTENDENT

Well known large manufacturing concern of gray iron castings, for one of its plants located in the Western part of Pennsylvania, has opening in the Foundry Division for experienced Foundry Superintendent capable of assuming responsibility for mass production. Permanent position. Write full particulars including age, experience, qualifications, salary expected and availability.

BOX 696

The FOUNDRY **CLEVELAND 13, OHIO**

WANTED
AGENTS MANUFACTURER

Of a complete line of long wearing sand and shot blast nozzles desires agents in Continental U.S., Canada and Mexico to handle sales of products. Established 8 years.

BOX 561

THE FOUNDRY **CLEVELAND 13, OHIO**

CERAMIC ENGINEER

Experienced Ceramic Engineer with actual knowledge of high temperature cements and foundry practice. A combined experimental and selling position in Middle West. Salary with chance to advance. When answering state qualifications, age, references, expected salary and when available. Address: Box 721, The FOUNDRY, Cleveland 13, Ohio.

MELTING FOREMAN

For a small highly-mechanized grey iron foundry located in midwestern Michigan. A good opportunity for a young man with sound cupola experience. Give full details in reply. Address: Box 708, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

To operate a nonferrous foundry making copper and alloy billets. Must be thoroughly capable of taking complete charge of plant operation, production and tooling. Give full qualifications and past experience. Communications will be treated confidentially.

BOX 707

THE FOUNDRY **16 E. 43RD ST.**
NEW YORK 17, N. Y.

FOUNDRY SUPERINTENDENT

Northwestern Ohio Company. To have overall supervision of two foundries—one gray iron and one malleable foundry. Some jobbing but mostly for manufacturing division of same plant. Must be experienced in all types of foundry work. Good opportunity with substantial salary for right man. Send full statement of qualifications for interview. Address: Box 596, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

To operate modern continuous gray iron foundry in Kansas, 30 tons daily. We are a leading manufacturer in our field. Particulars furnished upon request. Good salary and future for right man. Address: Box 672, The FOUNDRY, Cleveland 13, Ohio.

FOREMAN

Pattern Shop — Large nonferrous New York foundry wants good man to take charge of large pattern shop. Write fully. Address: Box 705, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY AND ENAMELING TECHNICIAN

An important Argentine plant employing over 200 wishes to contract a highly trained man in the manufacture of enameled cast iron bath tubs. Must have had long practical experience in molding, casting and enameling. State experience, qualifications and salary desired in first letter. Reply to: G. A. Casilla de Correo 18, Avellaneda (B.A.), Argentina.

GRAY IRON FOUNDRY FOREMAN

Jobbing and machinery; medium and heavy. Experienced on cupola, rigging and iron mixes. Give age, education, salary, former employers. Address: Box 740, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Capable foundryman to supervise foundry; pouring about 10,000 lbs. per day, 6 days a week; employing 25 men. Address: Box 739, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

Must be experienced in layout, foundry design, time and motion study, incentive systems and malleable iron operations. Experience with duplexing not prerequisite but helpful.

In replying please send full information, experience, salary expected.

All correspondence will be held in strict confidence. Our employes know of this advertisement.

BOX 754,

THE FOUNDRY **CLEVELAND 13, OHIO**

Classified Advertising

Help Wanted

STANDARDS — METHODS ENGINEER AND FOUNDRYMAN

Experience in setting standards, methods, incentives and general foundry practices which will cover a broad field of activity. Must have satisfactory personality and willing to accept responsibility. Location East. Give age, experience and salary desired in first letter. Address: Box 710, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

For a gray iron production foundry in a well established company located in a large city in Central New York. Interviews will be granted only to those who furnish complete information as to age, family status, education, experience, references and business references. Address: Box 718, The FOUNDRY, Cleveland 13, Ohio.

SALES ENGINEER

We are interested in securing the services of a good, reliable man for the sale of metals and alloys, principally to the major steel companies, but will only consider a man of experience and good record. Address: Box 636, Niagara Falls, New York.

EXPERIENCED PATTERN MAKER

For brass foundry located in Western Michigan. One acquainted with plumbers brass work. Give references and wages desired in first letter. Address: Box 625, The FOUNDRY, Cleveland 13, Ohio.

TIME STUDY ENGINEER

Piece work rates—estimating. Prefer young to middle age. Excellent opportunity with expanding operations. Experience essential. Foundry in Michigan. Address: Box 712, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Gray iron foundry pouring 6 to 10 tons per day. Employing 20 to 25 men. Knowledge of floor and production machine work required. Also heavy work under crane up to 3 tons. Modern equipment. Old established industry. Location Western New York. Give full history and salary expected. Address: Box 737, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

First class radiator foundry superintendent. Consideration will be given only to applicants with A-1 qualifications and having at least ten years' experience in this type of work. Give full information as to age, experience, etc. Write: Box 698, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Gray iron, practical experience in molding, rigging, mechanizing, production, mixes, etc., take complete charge. Start immediately. Philadelphia area. Address: Box 736, The FOUNDRY, Cleveland 13, Ohio.

CUPOLA OPERATING METALLURGIST

Two cupolas—200 ton daily melt—Gray Iron. Excellent opportunity with expanding operations. Experience essential—Foundry in Michigan. Address: Box 711, The FOUNDRY, Cleveland 13, Ohio.

DEPARTMENT SUPERVISOR

Long established Los Angeles area Electric Steel Foundry has openings for experienced department supervisors. State experience and salary expected in first letter. Address: Box 713, The FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

GRAY IRON FOUNDRY, MANUFACTURING MEDIUM—HEAVY CASTINGS REQUIRES CORE ROOM FOREMAN. GIVE FULL DETAILS, QUALIFICATIONS, PAST EXPERIENCE, SALARY REQUIREMENTS. ADDRESS: BOX 745, THE FOUNDRY, CLEVELAND 13, OHIO.

PNEUMATIC TOOLS — FACTORY REPRESENTATIVES WITH SALES AND SERVICE ENGINEERING EXPERIENCE

Old established manufacturer of pneumatic tools, now with expanded line of products is desirous of obtaining Factory Representatives. Give complete record of experience. Address: Box 138, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY FOREMAN

A working foreman to assist Foundry Superintendent in a well equipped production brass foundry; good opportunity for a hustler. State age, experience and salary desired in first letter. Address: Box 192, The FOUNDRY, Cleveland 13, Ohio.

Help Wanted

WANTED
SALESMEN or MANUFACTURERS' AGENTS

Now calling on foundries and forgings companies to handle complete line of Missouri refractories. Write in detail giving territories now covered, products handled, qualifications, etc. Address: Sales Manager, Chicago Fire Brick Company, 1467 Elston Ave., Chicago 22, Ill.

ELECTRIC ARC FURNACE MELTER

Must be thoroughly qualified in the melting of alloy steels for castings using the acid process. Only those experienced need apply. Address: Box 706, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Small gray iron foundry located 40 miles from Des Moines, Iowa, employing 25 squeezer molders wants foundry foreman capable of taking full charge of molding melting and pattern rigging. Must furnish references and have had plenty of experience. Address: Box 714, The FOUNDRY, Cleveland 13, Ohio.

FOREMAN

Exceptional opportunity for experienced foundryman with ability to produce quality castings. To take charge of squeezer and molding machines. Old reliable concern located near Cincinnati. Send complete details of qualifications, age and salary desired. Address: Box 728, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Well established nonferrous foundry, Milwaukee, Wisconsin. State age, experience, salary expected. Opportunity for right man. Address: Box 701, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

First Class foundry superintendent for a foundry employing 300 men producing gray iron castings. Located in New Jersey. Write giving full particulars as to age, experience, reference, etc., to Box 699, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Small Northwestern Ohio gray iron foundry wants foreman experienced in the production of small and medium castings. Position available immediately. State age, experience and salary desired. Address: Box 720, The FOUNDRY, Cleveland 13, Ohio.

SALESMAN

Very large nonferrous New York foundry and machine shop, sand, permanent mold, centrifugal, pattern shop, desires high quality salesman, good contacts. Good drawing account and commissions. Write in detail. Address: Box 599, The FOUNDRY, Cleveland 13, Ohio.

STARTING AND SUPERVISING NONFERROUS FOUNDRY

Man that is capable of starting and later supervising a new small nonferrous foundry. Centrifugal experience desirable but not essential. State age, experience and salary. Address: Box 704, The FOUNDRY, Cleveland 13, Ohio.

PLANT MANAGER

For medium size cast iron plumbing fixture plant. Give full particulars including salary. Address: Box 751, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

By well established Pennsylvania Foundry employing 200, to take charge of Gray Iron Foundry producing gerieral castings. Must be well-experienced in gray iron molding to supervise molders doing machine, bench and floor work. Must be able to get along with men; set up patterns; take charge of cupola and coreroom, if necessary. Good opportunity for advancement. Substantial salary. Good living conditions. State age and experience. Address: Box 660, The FOUNDRY, Cleveland 13, Ohio.

MATERIALS HANDLING AND FOUNDRY ENGINEER

Experience in design, layout, installation and costs of foundry equipment for Eastern Engineering Company. Unusual opportunity. Will have responsible charge of work. Must have business aptitude and satisfactory personality. Give age, experience and salary desired in first letter. Address: Box 709, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY EXECUTIVE

Thoroughly qualified practical grey iron foundryman with successful record as plant manager. Have nineteen and a half years' experience in production work plus three years of foundry engineering. Desire to make connection with an organization who would appreciate one who is a go-getter and can operate a plant on a well organized and solid basis. Forty-two years of age and now employed. Address: Box 636, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Who has worked in nonferrous foundries for 35 years as moulder, foreman, superintendent and general manager would like to take charge of small brass-aluminum foundry in a small town on a straight salary or on a salary and percentage basis. Hard worker and can give the best of references. Know all phases of foundry from melting to quoting on work, rigging, etc. Address: Box 742, The FOUNDRY, Cleveland 13, Ohio.

GRADUATE METALLURGICAL ENGINEER

Ten years of ferrous foundry experience including cupola and electric melting, metallurgy, gating, customer contact, industrial engineering and cost analysis. Desires opportunity in small or medium sized organization as assistant to manager-owner with opportunity to participate in ownership. Chicago area preferred. Address: Box 743, The FOUNDRY, Cleveland 13, Ohio.

SALES METALLURGIST

46 with background in cast specialties—iron and steel, desires affiliation with company where foundry experience and sand metallurgical knowledge count. Address: Box 748, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN OR SUPERINTENDENT

Practical trained foundryman. Well versed in all phases of production and jobbing work on steel and alloy castings. Address: Box 729, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Technical trained with 25 years' practical experience as coremaker, molder, foreman and foundry superintendent. Understand making castings by analysis. Desire position that will be permanent with medium sized foundry. 43 years of age and can furnish the best of references. Address: Box 733, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Forty years of age. Twenty years' experience. Specializing in H.C. Copper 90 plus, Beryllium copper 100 to 400 Brinell high pressure bronze. Salary open. Employed at present. Replies confidential. Go anywhere. Address: Box 731, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY FOREMAN

Practical experience on high grade work including chandelier castings, grave markers, ornamental bronze, hardware, steam valves, jobbing and production work. Prefer position with manufacturing plant. Address: Box 472, The FOUNDRY, Cleveland 13, Ohio.

JUNIOR METALLURGIST

Veteran, B.S. in Metallurgical Engineering. Three years' experience in research and development of aluminum and magnesium casting alloys. Desires position in a nonferrous production foundry. Willing to start at bottom if opprtunity exists for advancement. Address: Box 727, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Graduate engineer, age 36. Diversified experience as Metallurgist, Heat Treat Superintendent and Foundry Manager. Ability to plan and direct to secure economical results. Working knowledge of all phases of manufacturing. Address: Box 694, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MAN

College graduate, twenty years' experience in a supervisory and technical capacity as superintendent, chemist-metallurgist, foreman heat treating and cleaning room. Experienced in cupola and Electric furnace operation. Knows foundry sands for light, medium and heavy work. Desires connections with a reliable steel or gray iron foundry. Mid-west preferred. Address: Box 684, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Positions Wanted

GRAY IRON FOUNDRYMAN

Broad foundry and management experience capable of directing operations efficiently and profitably. A practical executive with qualified record for maintaining good customer and personnel relations and working out foundry problems promptly and effectively. Address: Box 668, The FOUNDRY, Cleveland 13, Ohio.

PRACTICAL-TECHNICAL GRAY IRON FOUNDRYMAN

Molder by trade with wide range of experience producing quality castings from molder to superintendent in general jobbing machine tool and high production. Well versed in metal and sand control, cores, rigging, molding machines and core blowers, mechanized equipment. Wants to make connection with reliable firm needing the services and experience of a good foundryman. Location New England, East Coast. Address: Box 726, The FOUNDRY, Cleveland 13, Ohio.

ASSOCIATED MANAGER

College graduate in Business Administration. Nine years' experience in high production aluminum, magnesium, grey iron and brass in two foundries. Able to get along with men and not afraid of responsibility. Qualified in machine equipment and pattern procurement, planning and estimating, time study and plant layout on dry and all methods of green sand molding on conveyor lines. Age 34, married, family. Address: Box 693, The FOUNDRY, Cleveland 13, Ohio.

BRASS FOUNDRY SUPERINTENDENT

A practical trained foundryman well versed in all phases of production and jobbing work in bronze, aluminum and nickel covering such lines as valves, railroad, automobile, bushings and shipbuilding is seeking a change. Thirty years' experience, married, steady and reliable. Will go anywhere. Available on short notice. Address: Box 738, The FOUNDRY, Cleveland 13, Ohio.

ELECTRIC STEEL MELTER

Fifteen years' experience on carbon and all alloys, including stainless, etc. Will guarantee finest quality castings without de-oxidizers in furnace, ladle or molds. Capable of taking complete charge of melting department. Age 34. Available immediately. Will go anywhere. References. Address: Box 700, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY AND INDUSTRIAL ENGINEER

Available on consulting basis or short term contract to aid small founders establish, revise and maintain job evaluation, wage incentive, foundry methods, plant layout. Fifteen years' experience in grey iron, malleable and steel. Address: Box 719, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Desires to contact foundry in need of an experienced man with best of references. Well qualified to handle men in all departments. Address: Box 734, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

M.S. Metallurgical Engineer, at present manager of Eastern steel foundry, wants responsible position with progressive company. Has unusually fine record, good labor relations. Address: Box 747, The FOUNDRY, Cleveland 13, Ohio.

SALESMAN

Retired foundryman. Good health. Fifteen years' selling sand, 25 years selling specialty binders. Address: Box 648, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST-ENGINEER

Graduate Chemical Engineer age 35. Qualified department head. Diversified experience in metallurgy, laboratory practice, foundry practice, process and product development, machining, carbide tooling, inspection, heat treating and engineering. Desires position as metallurgist or production position that requires coordinating metallurgy, engineering and production. Address: Box 695, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT OR GENERAL FOREMAN

Experienced in taking charge malleable gray iron and brass foundry. Metallurgy and sand control experience. Practical molder, coremaker and melter. Good labor relations. New England preferred. Age 36, married. Address: Box 579, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

CUPOLA EXPERT

Desires permanent position as foreman with organization operating three or more cupolas. Will produce economical results. Address: Box 753, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT (Iron and Steel)

Now employed desires change with increased responsibilities either as works manager or superintendent. Twenty-three years' practical experience in every phase of the foundry business. Thoroughly familiar with gating and heading in both jobbing and production methods. Capable of producing quality castings at satisfactory costs. Southern location preferred. Very successful in handling men. Engineering graduate. Address: Box 755, The FOUNDRY, Cleveland 13, Ohio.

COREROOM FOREMAN

Twenty-five years' experience as coreroom foreman on production and jobbing—from raw material to finished product. Arrange work and help both male and female for largest production. Will go anywhere. Address: Box 750, The FOUNDRY, Cleveland 13, Ohio.

BRASS-BRONZE CASTING

Veteran 30, married, children, 1½ years' experience in brass-bronze casting and cost desires position with opportunity for advancement. Available immediately, will go anywhere in U.S.A. Address: Box 741, The FOUNDRY, Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN

With twenty years as assistant foundry superintendent on electrical steel, open hearth steel, gray iron and semi-steel. Know floor, pit and machine molding for production. At present assistant foundry superintendent. Age 56. Married. References if desired. Address: Box 642, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

48 years of age, 25 years' experience including executive duties, purchasing, personnel and safety. Prefer sales position—foundry supplies or equipment. Wide acquaintance with foundry executives. Address: Box 732, The FOUNDRY, Cleveland 13, Ohio.

SAND CONTROL SUPERVISOR

With metallurgical experience in large mechanized, malleable foundry desires position with future. Address: Box 730, The FOUNDRY, Cleveland 13, Ohio.

Opportunities

OPPORTUNITY

We can furnish empty tight and slack wooden barrels also steel drums for your products. ADDRESS: BUCKEYE COOPERAGE STATION, C.P.O. BOX 1501, CLEVELAND, OHIO.

OPPORTUNITY

Wanted 6,000 fine grain grey iron refrigeration compressor crankcase castings monthly for 3 years. Each weigh approximately 22 lbs. Design already proven and complete pattern parts available. Also need cylinder head, piston, etc. Address: Box 749, The FOUNDRY, 16 E. 43rd St., New York 17, N. Y.

EXPORT REPRESENTATION

American mfr. of quality steel cleaning and peening shot and grit wants foreign trade. Big stocks. Ask for literature and samples. Advise lines now selling, territory covering.

BOX 617
The FOUNDRY CLEVELAND 13, OHIO

Capacity Wanted

WANTED

Foundry to make small gray iron castings. Can give contract for 350 to 500 ton first year. Pattern plates furnished. Address: C. G. S., P. O. Box 31, Oconto, Wis.

Open Capacity

OPEN CAPACITY

For BRASS, BRONZE and ALUMINUM CASTINGS—small and medium sized.

ATLANTIC BRASS WORKS
2035 W. HARRISON ST.
CHICAGO 12, ILL.

OPEN CAPACITY

For Bronze and Aluminum Castings. Prefer production work on matchplates. For quotations wire or write:

EMPIRE FOUNDRY & MACHINE CORP., INC.
29th & RAILROAD ST.
ASHLAND, KENTUCKY

PORCELAIN ENAMELING

We now have open capacity for about 1 ton of gray iron castings daily. Small sanitary plumbing ware preferred.

OTTO SCHEINER
DAYTON PORCELAIN ENAMELING CO.
180 So. LUCAS STREET
COLUMBUS 8, OHIO
ADAMS 7198

CAPACITY

Our foundry has open capacity for small and medium size aluminum sand castings.

HOMANS METAL FOUNDRY
RR 1, Box 724
EAST MOLINE, ILL.

OPEN CAPACITY

Have open capacity for squeezer work—Grey Iron Castings—Foundry located in Wisconsin. Address: Box 702, The FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

FOR SALE

FOUNDRY—Fully equipped and operating. Produces light gray iron castings. Capacity 25 tons per day.

FOUNDRY—Gray iron foundry producing heavy machinery castings. Excellent opportunity for machinery builder to acquire operating foundry.

FOUNDRY—Large well equipped iron foundry producing plumbing ware.

EDWARD H. ZOLL
INDUSTRIAL PROPERTIES THROUGHOUT THE EAST
790 BROAD ST. NEWARK 2, N. J.
PHONE MARKET 3-4539

FOR SALE

Grey iron foundry. Well equipped makers of medium and light weight castings. Six ton per hour capacity. Good buildings, 2 acres with siding. Excellent location in Milwaukee vicinity. $150,000.00 yearly sales. Plenty orders. Owner retiring. Address: Box 735, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE OR LEASE

Small grey iron foundry, immediate possession. Address: Box 744, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Light grey iron foundry, production jolt squeezer shop—capable of 30 ton per day capacity, with machine shop and extra buildings over 50,000 square feet. Location Middle West. Address: Box 703, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Wanted-To-Buy

WANTED
GREY IRON FOUNDRY

Within 100 miles of Chicago. Well established responsible company interested in lease, with option to purchase, grey iron foundry of 6 to 10 tons daily capacity; or will consider outright purchase if price is attractive. Would also consider buying more than 50% interest. Replies will be held in strict confidence.

BOX 716
The FOUNDRY CLEVELAND 13, OHIO

WANTED

American Gasoline Sand Cutter same as or similar to Model AA712, size 62". Inside width of wheels, rim to rim 65", outside width 72". Overall width not more than 7' 5", cutting wheel 52". Address: **SANITARY CO. OF AMERICA, LINFIELD, PA.**

FOUNDRY NAILS
Any Quantity
4 x 8—or any size close. Can substitute roofing nails.
GLAZER STEEL CORPORATION
610 CHAMBERLAIN ST. PHONE 5-0738
KNOXVILLE, TENN.

WANTED

Steel flasks 36 x 36 x 18 or 36 deep or close thereby. Address: SWEDISH CRUCIBLE STEEL COMPANY, 8561 Butler, Detroit 11, Michigan.

MIXER WANTED

Small or medium size cord sand mixer. State size and condition. Also wanted 1—27 x 32 Tumblast. Address: Box 752, The FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

Employment Service

SALARIED POSITIONS
$2,500-$25,000

This thoroughly organized confidential service of 36 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 Dun Bldg. Buffalo 2, N. Y.

GRAY IRON FOUNDRY EMPLOYMENT

We are receiving many inquiries for superintendents, metallurgists and foremen. We shall be glad to hear from qualified men. No charge.

Gray Iron Founders' Society Inc.
1010 Public Square Building Cleveland, Ohio

For Sale

FOR SALE

Used Tumbling Barrels, 36" dia. 60" long. Excellent condition. New modern cupolas all sizes, shipment 4 to 6 weeks. Address: Room 558, 206 Essex Street, Boston 11, Mass.

For Sale

FOR SALE

2,000 FT. GRAVITY ROLLER CONVEYOR 18" WIDE, COMPLETE WITH STANDS AND CURVES, PRACTICALLY NEW.

1—Clark Dual Tractor—3 Wheel—2 cylinder Gasoline Engine.

1—Elwell-Parker Electric Tin Plate Fork Truck, can be used for Furnace Charger.

2—Clark "Clarkat" Tructractors, 1940-1941 Models.

INDUSTRIAL TRADING CO.
1225-31 WEST MONROE STREET
CHICAGO 7, ILLINOIS

FOR SALE

1—Ransohoff Water Mill 36 x 60 side loading and end loading. Automatic star separation and star return. Complete with direct drive and in good condition.

1—Plain jolt machine 20 x 30 table.

1—Cylindrical-covered ladle (geared) 29" x 28½" (Modern) 1500 lbs. capacity.

1—405 Osborn Jolt Roll-over pattern draw; jolt cylinder 12" dia. Pattern draw 18" max. flask limit 64".

1—46" dia. x 56" inside length tumbling barrels.

2—30" dia. x 42" inside length tumbling barrels.

BOX 635
The FOUNDRY CLEVELAND 13, OHIO

CENTRIFUGAL COMPRESSORS AND BLOWERS

2100 CFM GE with 10 HP 3/60/3450 RPM motor.
1200 CFM Buffalo, 9¼ x 7 x 7¼ with 7½ HP, 220/3/60 1750 motor.
20¼ x 16¼ x 18¼ Allington and Curtis No. 55 (belt drive).
10½ x 10½ American size 5, (belt drive).
(2) 8 x 8 Sturtevant size 21061-9 (belt drive).
THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE., CLEVELAND 14, OHIO

TEMPERING FURNACE
LARGE SIZE
LINDBERG FOR SALE

Type 487260-EH Vertical Cyclone complete with AA Automatic Lindberg Control. This double-purpose furnace (air or salt bath) is ideal for the treatment of aluminum and magnesium. Used equipment for immediate delivery. Dept. 205 E.

DALMO VICTOR CO.
SAN CARLOS CALIFORNIA

FOR SALE

20 Ton Capacity Jolt Molding Machine Manufactured by Herman Pneumatic Machine Co. This machine was purchased by us from the Herman Pneumatic Machine Co. as a thoroughly rebuilt machine in 1939. It cost $4,800.00 The table top is 7 ft. x 10 ft. The jarring capacity is at 80 lbs.; gage pressure is 45,000 pounds.

Before we really got to using the machine our work changed so that it has had practically no service since we have owned it. Nevertheless we will remachine the table top and test the machine out before shipment to a purchaser although it is in excellent condition—right now. We have foundation drawings.

Our price $2,000.00 F.O.B. Cleveland, Ohio

FULTON FOUNDRY & MACHINE CO., INC.
EAST 75TH ST. & MORGAN AVE.
CLEVELAND 4, OHIO

For Sale

REBUILT
BLOWERS—FANS—EXHAUSTERS

Centrifugal blowers for gas and oil burning Sand blast, grinders and dust exhausters Roots-Connersville positive cupola blowers Welding fume exhausters—Ventilating fans.

GENERAL BLOWER CO.
8601 FERRIS AVE.
MORTON GROVE, ILL.

FOR SALE

PANGBORN ROTOBLAST BARREL—Type GH-1-No. 3 complete with motor. In excellent condition.

QUINCY STEEL CASTING CO., INC.
NORTH QUINCY 71, MASS.

FOR SALE

1—No. 815 Johnson & Jennings Jolt Rollover Pattern Draw Molding Machine 30" x 40" Table Pattern Draw of 15" Cap. Condition excellent.

BOLEN MACHINE WORKS
GRAND JUNCTION, COLO.

FOUNDRY CUPOLA

Approximately 46" outside diameter of shell. Modern Cylindrical Insulated Ladle—approximate capacity 1,000 pounds.

BAY CITY FOUNDRY COMPANY
BAY CITY, MICHIGAN

FOR SALE

2—No. 9 Whiting 90" shell cupolas
1—3 ton Shepard swinging beam cupola charging hoist
1—Willberham Green blower with 60 h.p. 25 cycle motor.

Above equipment is available on an "as is, where is" basis.

HEWITT RUBBER CORP.
240 KINGSTON AVE.
BUFFALO 5, NEW YORK

FOR SALE

Tilt type high pressure gas fired furnaces complete with crucibles and base blocks
2—No. 275 Harvey brass Capacity—800 lbs.
1—No. 150 Monarch brass Capacity—375 lbs.
1—No. 150 Monarch aluminum Capacity—400 lbs.
Write or wire
C. EDGAR MELVIN, PURCHASING AGENCY
BAYARD & HAMBURG STS.
BALTIMORE 30, MARYLAND
STANDARD GAS EQUIPMENT CORP.

FOR SALE

EXHAUST TYPE TUMBLING MILLS
1—60" Diameter x 72" long 1" shell
1—49" Diameter x 60" long ¾" shell
Complete with stands and bearings but without door latches
Both mills secondhand—prior inspection preferred at our plant

COLUMBUS IRON WORKS COMPANY
COLUMBUS, GEORGIA

FOR SALE

1—Herman Pneumatic Machine Company Serial No. 360. 60" x 84" independent turn over and pattern drawing device with 60" x 80" jarring molding machine. Bumper type. Machine used less than ten years. Inspection at plant of Kewanee Boiler Corp., Kewanee, Illinois.

FOR SALE
CUPOLA BLOWER

No. 1230 Sutorbilt Positive Pressure Blower, 6 cu. ft. per revolution capacity with extended base and vee belt pulleys. This is a new blower in original crate. Price $1200, f.o.b. Chicago.

HANNIFIN MFG. COMPANY
MR. O. J. MAHA
621 SOUTH KOLMAR AVE., CHICAGO 24, ILL.

Classified Advertising

For Sale

OVERHEAD CRANES

1-Ton
Whiting 33′ Span
Curtis 24′ Span
1½-Ton
Shepard Niles 25′6″ Span
P & H 34′ Span
2-Ton
Louden 19′2″ Span
Box 36′9″ Span
Detroit 28′ Span
3-Ton
Shaw 33′ Span
P & H 25′ Span
Northern 22′ Span
Manning, Maxwell & Moore 48′¾″ "Conco" 48′ and 26′6″ Spans
5-Ton
Whiting 47′4″ Span
38′10½″ Span D.C.
Northern 30′9″ Span
Milwaukee 70′ Span
Milwaukee 66′9″ Span
Manning, Maxwell & Moore 70′ Span
Manning, Maxwell & Moore 47′4″ Span
Shaw 36′ Span
Champion 37′6″ Span
American 70′ Span
American 47′4″ Span
6-Ton
P & H 77′ Span
American 77′ Span
7½-Ton
Shepard 36′ Span
10-Ton
Shaw 68′ Span
Shaw 73′ Span
P & H 30′ Span
P & H 87′6″ Span
P & H 80′ Span
Northern 71′10½″ Span
Northern 60′ Span
Morgan 55′6″ Span
Morgan 39′5″ Span
Morgan 52′3″ Span
Milwaukee 66′9″ Span
McGill 85′ Span
Lane 50′ Span
Emsco 75′ Span
Dominion 35′ Span
Cleveland 38′1½″ Span
Cleveland 50′ Span
Alliance 71′10½″ Span
Alliance 58′9″ Span
Albany 60′ Span
15-Ton
Whiting 71′10½″ Span
Northern 53′ Span
Erie 60′ Span
Chesapeake 55′6″ Span
Case 51′ Span
20-Ton
Shepard Niles 49′6″ Span
P & H 51′4″ Span
Northern 60′ Span
Morgan 60′ Span
Cleveland 65′ Span
25-Ton
Whiting 106′ Span
Tysaman 60′ Span
P & H 70′ Span
Morgan 52′3″ Span
Cleveland 106′ Span
Case 63′ Span
Bedford 50′ Span
30-Ton
Whiting 80′ Span
P & H 80′ Span
P & H 60′ Span
Morgan 30′ Span
Case 41′ Span
35-Ton
Bedford 50′ Span
Northern 22′ Span
50-Ton
Shaw 95′ Span
Shaw 69′10″ Span
Dominion 80′ Span
Cleveland 71′10½″ Span
75-Ton
Morgan 59′2½″ Span
Alliance 78′ Span
Alliance 37′ Span
80-Ton
American 40′6″ Span
125-Ton
Morgan 100′ Span
150-Ton
Whiting 30′ Span
175-Ton
Morgan 54′ Span
200-Ton
Alliance 100′ Span

Telephone us collect to discuss your requirements.

ECONOMY CO., INC.
49 VANDERBILT AVENUE, NEW YORK 17, N. Y.
Telephones: MUrrayhill 4-2294, 4-2893, 4-2295, 4-2844, 4-2296, 4-8292

FOR SALE

American Wheelabrator, size 27″ x 36″. Complete with motors and loading skip and miscellaneous repair parts. 2 years old. Price $2500.00. Cost new—$5′00.00. Address: NOBLESVILLE CASTINGS COMPANY. NOBLESVILLE, INDIANA.

FOR SALE

Pease, Peerless Model, Serial 2236R, 220 volt, 34 amp., 33″ canvas, continuous blue print machine, washer and dryer. Recently overhauled. Located in Akron, Ohio. Price $450.00 f.o.b. Akron. Address: Box 725, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

One Pittsburgh Electromelt Furnace, Type 5, Size ST, with Transformer and Motor Generator, complete. This equipment has only been in operation one year. Address: Box 686, The FOUNDRY, Cleveland 13, Ohio.

REBUILT EQUIPMENT

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed. All sizes used steel flasks.

HAYNES FOUNDRY EQUIPMENT COMPANY
1734 LAKE ST. KALAMAZOO 21, MICH.

FOR SALE

Model 48A Davenport jolt rollover draw molding machine, capacity—6,000 pounds, table size —48″ x 82″. Only slightly used and guaranteed like new. Bargain.

THE FRANCIS & NYGREN FOUNDRY CO.
2542 FILLMORE ST., CHICAGO 12, ILL.

FOR SALE

1—Beardsley Piper Sandslinger, stationary type, double belt 19″ head, 4″ tip 7-10 C.F.M. ramming capacity, first arm 8′, second arm 4′, ramming motor 20 H.P. 1200 R.P.M., 220 V., 60 cycle, total 22½ H.P.

This machine slightly used, in excellent condition and can be shipped immediately.

GREEN COLONIAL FURNACE COMPANY
DES MOINES 7, IOWA

FOR SALE

1—6 FT. X 8 FT. SIMPLICITY SHAKEOUT, COMPLETE WITH MOTOR. SERIAL NO. 68-SOD-138. THIS EQUIPMENT HAS BEEN IN OPERATION ONE MONTH. CONDITION EXCELLENT. ADDRESS: BOX 746, THE FOUNDRY, CLEVELAND 13, OHIO.

REBUILT EQUIPMENT IN STOCK

Molding Machines
2—International Type F 24″ x 10″ Stationary Power Jolt, Rollover, and 10″ draw.
1—International Type M 24″ x 10″ Portable Power Jolt, Hand Rollover and Draw.
1—Osborn No. 450 Stationary Jolt Stripper.
3—Arcade Modern No. 2-38 Portable or Stationary Hand operated Squeeze Rollover Draw with swing out table.
5—Mumford 3″ cyl. Core Jolt with 20″ x 15″ table.

Metal Melting Equipment
New 32″ to 41″ dia. shell cupolas made to order.
1—Monarch Tilting Iron Pot Aluminum Furnace 100 lbs. cap. Gas or Oil.
2—Hausfeld Tilting Crucible Aluminum Furnaces 33″ dia. shell. Gas or Oil.
2—Hausfeld Open Flame Tilting Brass Furnaces 400 lbs. cap. Gas or Oil.
2—Monarch-Rockwell Rotating 500 lbs. brass. Oil.

Blowers for Cupolas and Furnaces
Maxon-Premix Blower Sets for Gas ⅛ to 1 H.P. Motor Driven Centrifugal blowers to 2 lbs. press. Belt Driven Centrifugal blowers for Cupolas.

Tumbling Mills and Sand Blast
1—Sly 48″ dia. x 60″ long, round tumbling mill. Single pulley drive.
1—24″ dia. x 30″ long light duty horizontal tumbling mill with 3 HP motor mounted and belted.
3—Portable Sand Blast generator tanks 500 lbs. sand capacity.
1—173 Safety speed-rite double end snagging grinder 24 x 3 wheel motorized 15 horsepower AC V belt driven.
Air Compressors 1 to 60 H.P.

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PHONE PARKWAY 7812

FOR SALE

Molding Machine
49″ x 96″ Table
with 16″ pattern draw
International Type F
Roll-over Jolt
Used only 6 months.

WAYNE FOUNDRY CO.
DETROIT 10, MICH.
TEL. LAFAYETTE 8226

For Sale

OVERHEAD ELECTRIC TRAVELING CRANES

(1)—10-ton Toledo, 3-motor, 230-VDC., 51′6″ span, cage operated.
(1)—15-ton Shaw, 106′8″ span, 230-VDC., CG. OP., 36′0″ lift, (THIS IS AN EXCELLENT HIGH LIFT CRANE FOR OUTSIDE SERVICE).
(1)—3-ton Chesapeake Gantry, 3-motors, CG. or FL. OP., 220/440-VAC., 18′11″ bet. legs, 5′6″ overhang each end.
(1)—7½-ton, 2-motor, CG. OP. Shepard Monorail Hoist, 230-VDC., 40′0″ lift (A GOOD HOIST FOR CUPOLA CHARGING SERVICE).

MONORAIL ELECTRIC HOISTS

	Tons	Make	Current	Remarks
(1)	½	LO-Hed	220-VAC.	FL. OP.
(3)	½	Shepard	230-VDC.	2-motors
(4)	½	Shepard	230-VDC.	FL. OP.
(1)	2	Shepard	230-VDC.	FL. OP.

SPECIAL:
(1)—No. 2 Simpson Mixer, high side with bucket loading equipment, extra muller tires.

MOTOR GENERATOR SETS
(1)—Factory-built 220-KW, 250/275-VDC. Allis-Chalmers on C.I. base, 288-HP., Syn. motor, 1200-RPM., 440/3/60-cy., with complete A.C. and D.C. panels and starting equipment.

(SEND FOR OUR STOCK LIST OF STANDARD A.C. AND D.C. MOTORS. CRANE AND MILL TYPE, CONTROL EQUIPMENT, ELECTRIC BRAKES, ETC.)

WE OWN AND HAVE ALL THIS EQUIPMENT IN STOCK. IT IS OFFERED REBUILT IN OUR LARGE, MODERN PLANT AND FULLY GUARANTEED.

T. B. MACCABE CO.
4304 CLARISSA ST.
PHILADELPHIA (40) PA.

FOR SALE

A well-equipped brass and gray iron foundry. Location Northwestern Ohio. Address: Box 468, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE
SANDCUTTER

Cleveland American No. 697, Model D, type 90-68, 30″ cutting wheels 5′ 0″ long between housings, in good condition. ADDRESS: CONTRACTORS FOUNDRY, OAKS, PA.

FOR SALE

1—#2½ Whiting Model B Cupola. Complete with Motor Driven Blower. Address: Box 663, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Model K American sand cutter used very little. Cost new $7200, price $3500. Address: Illinois Foundry Co., Springfield, Ill.

FOR SALE

16 Fisher tilting and stationary melt furnaces; 14 Lindberg gas and electric furnaces, all new in 1942; sandblast equipment, complete core oven 7′ x 10′ x 167′, sand storage bin in five sections 6350 tons capacity, conveyors, miscellaneous other foundry equipment. Address: Max Zeigler & Bros., Muncie, Ind.

Correspondence Course

THE CUPOLA IS THE HEART OF THE FOUNDRY

Turn the searchlight of McLain's System on your cupola. 90c of every dollar is spent before melting begins—but some make it look like 30c by indifferent melting. Are you using the maximum percentage of steel scrap in your castings? If not, why not? The value of the scrap pile lies in the fact it offers you food for thought. Our system is worth the fee as a desk reference. Synopsis free.

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with light-color VELSICOL *Coresin Oils*

Now you can bake large and small cores together in the *same* oven with the *same* baking cycle without danger of over-baking. VELSICOL Coresin Oil in the sand mix makes possible this operating economy because it makes all cores resistant to over-baking, accelerates core baking-time of the larger cores. This is only one important feature of an oil that is an effective tool in efficient castings production. Absolute uniformity of VELSICOL Coresin Oil plus such exclusive features as light color and freedom from over-baking make it the preferred oil in America's most progressive foundries.

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HIGH, FAST TENSILE STRENGTH
LOW GAS EVOLUTION
CLEAN SHAKEOUT
UNIFORMITY
RAPID, PROPERLY TIMED COLLAPSIBILITY

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Manufacturers of Coresin Core Oils • Aromatic Solvents • Synthetic Resins • Insecticides

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Foundry Leaders Everywhere

Use Par-Blast CLEANING ROOMS FOR *Low Cost Blast Cleaning*

Par-Blast Equipment Is Used by the Leaders in Industry

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American Brake Shoe & Foundry Co.
Cadillac Motor Car Co.
Carnegie-Illinois Steel Corp.
Delco Remy Co.
Ford Motor Co.
General Electric Co.
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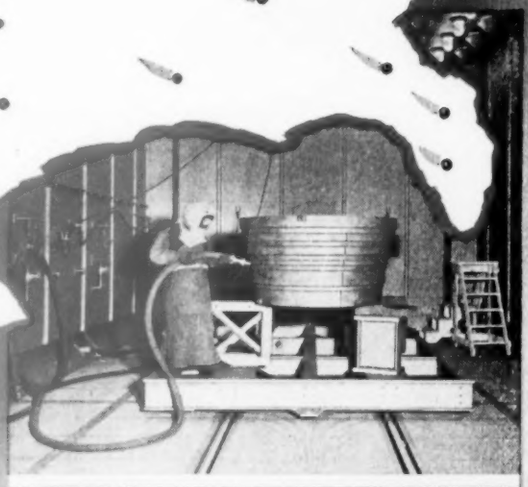
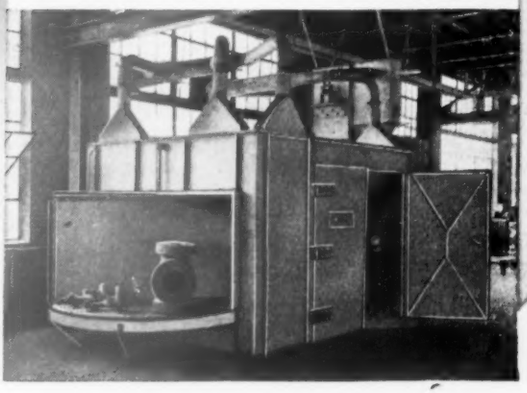




PAR-BLAST ***Cleaning Equipment is backed by over 25 years of creative engineering experience plus practical experience gained from installations throughout the country***

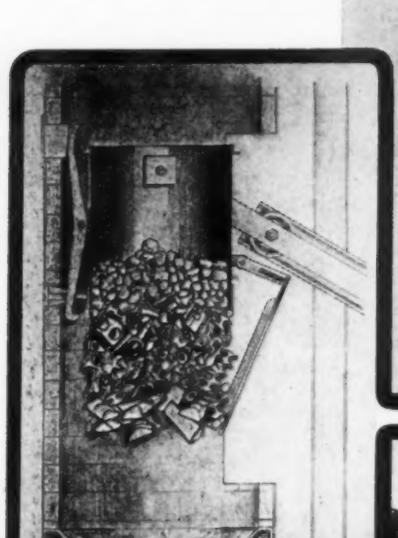
Leaders in the industry use Par-Blast rooms for shot, grit and sandblast cleaning because they do the job quickly . . . efficiently . . . and at a lower cost. Par-Blast rooms are custom designed to handle the specific work or pieces to be cleaned. Turntable, Car and Monorail models are equipped with effective blast tanks . . . efficient abrasive reclaiming units . . . downdraft ventilation and adequate illumination. Walls are heavy steel plate, reinforced and braced for strength and rigidity. Doors are self-closing and self-sealing. Let us analyze and recommend the best type equipment for your plant . . . there's no obligation . . . write today, or send for bulletin No. R-41.

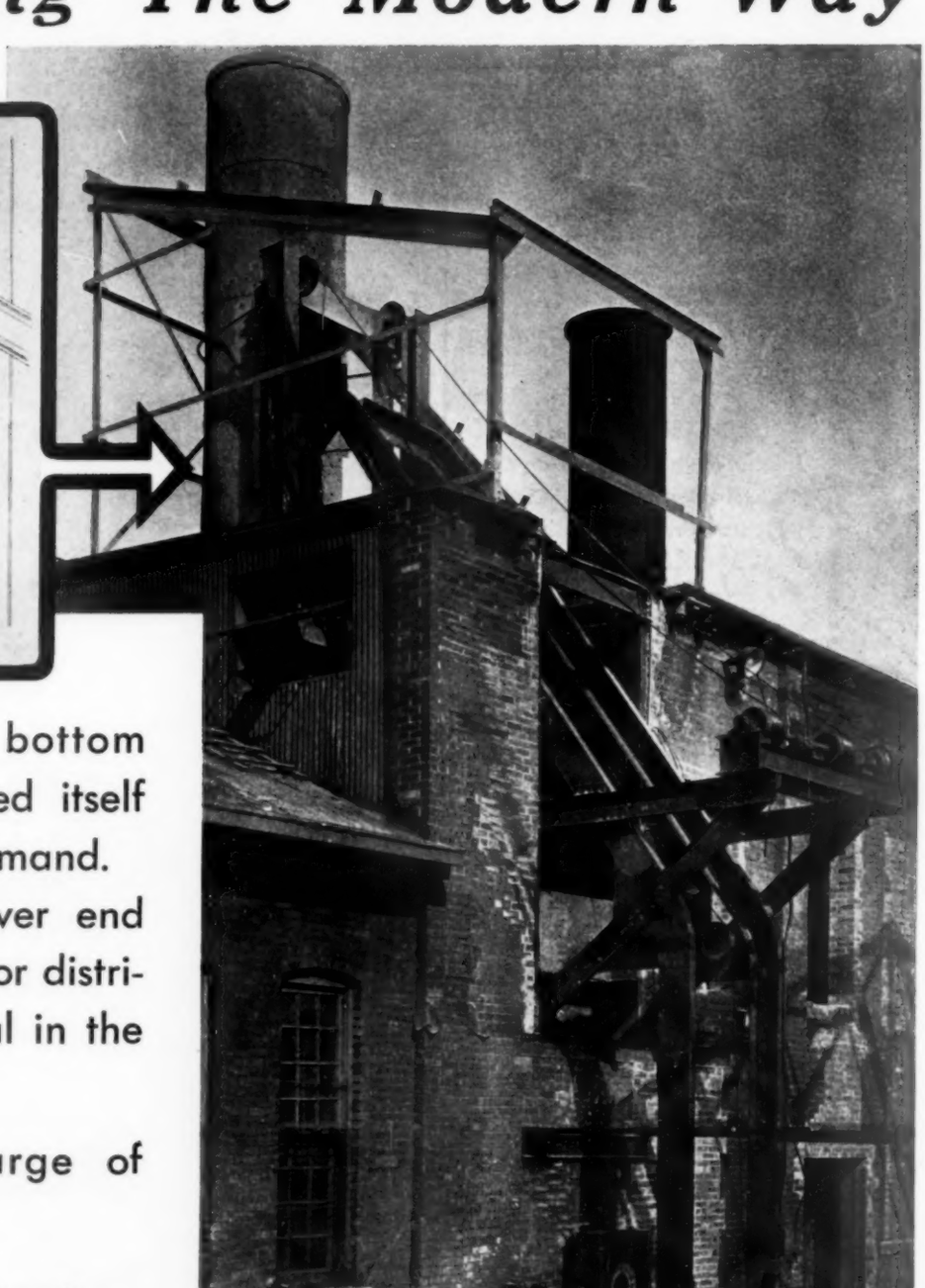
Parsons CREATIVE ENGINEERS MANUFACTURERS

ENGINEERING CORP.

2545 EAST 79th ST. CLEVELAND 4, OHIO

Charging The Modern Way





MODERNS drop bottom bucket has proved itself by the present demand.

No more end over end dumping with poor distribution of material in the cupola.

Complete discharge of material.

The best stratification —the best melting— the best metal

MODERN Charger at
Pohlman Foundry Co.
Buffalo, N. Y.

Cupolas • Cupola Chargers • Covered & Insulated Ladles • Lifetime Geared Ladles •
Improved Bottom Pour Ladles • Metal Pouring Systems • Crane & Monorail Systems
For Metal & Mold Handling • Furnace Charging Cranes • Electric Mold Skin Driers

MODERN EQUIPMENT CO.
PORT WASHINGTON, WIS.

What's a trademark worth . . .

EVER GIVE IT A THOUGHT?

COME TO

HEADQUARTERS

FOR

FOUNDRY EQUIPMENT and SUPPLIES

We manufacture or handle

"Everything for a Foundry"

Whether your order calls for a foundry facing, a hundred chaplets, ladle bowl or liner, or a Beardsley & Piper Sandslinger, when sent to Stevens it is handled by men who know their business and YOURS. The Stevens Sales and Service Departments are ready to serve you at all times.

CORE WASHES for GRAY IRON ALUMINUM BRONZE BRASS STEEL

SEACOAL PLUMBAGO CORE PASTE CORE DAUB PARTINGS CORE OIL

"The Wise Buyer Buys— Stevens Supplies"

FREDERIC B. STEVENS INCORPORATED

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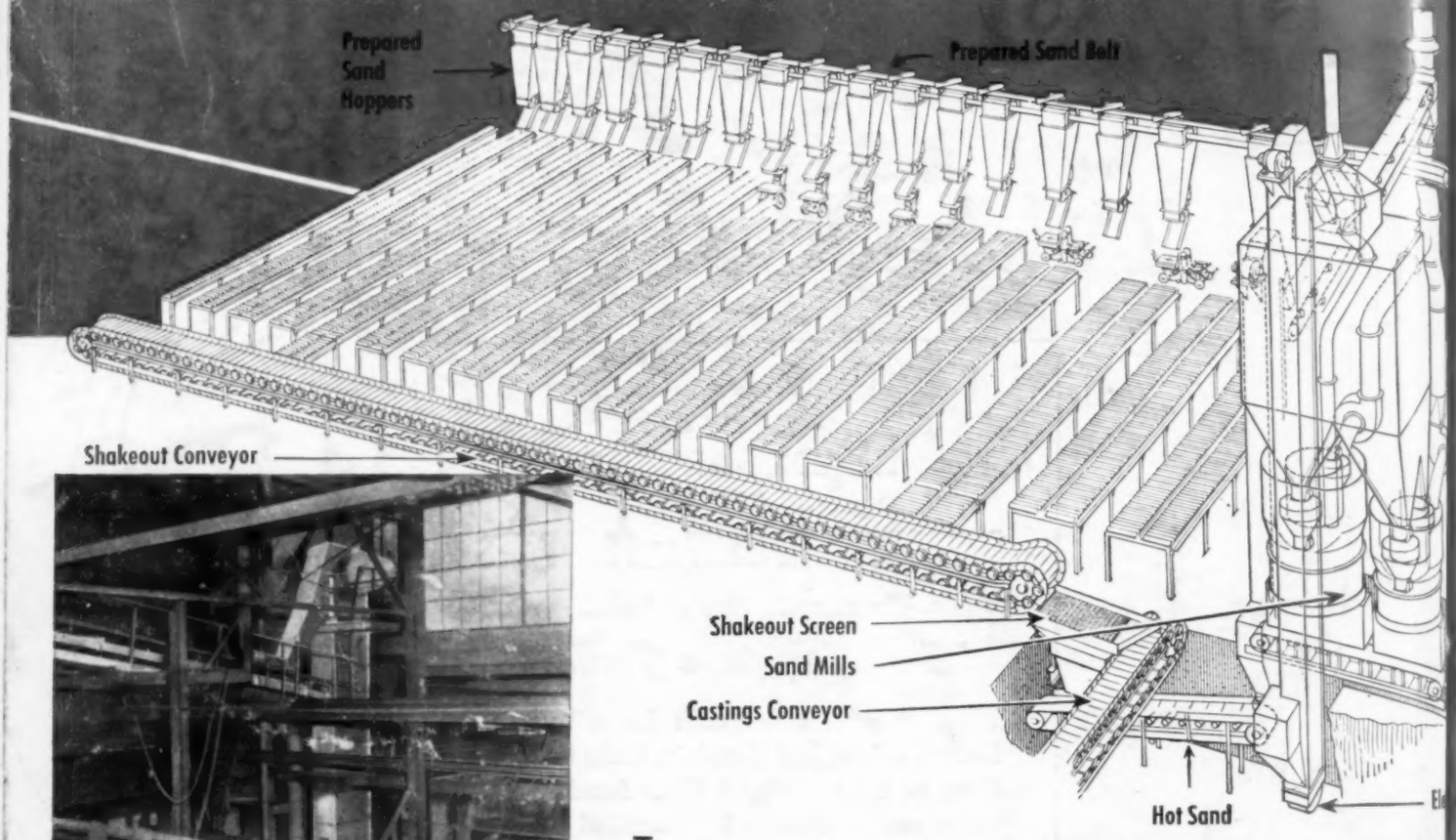
- NEW YORK and PENNSYLVANIA, 93 Stone St., Buffalo, N. Y.
- INDIANA . Hoosier Supply Co., 36 Shelby St., Indianapolis, Ind.
- CANADA . FREDERIC B. STEVENS OF CANADA, LIMITED
- 1262 McDougall St. . . . . Windsor, Ontario
- 2368 Dundas St., West . . . . . Toronto, Ontario

DESIGN FOR EFFICIENCY

Forest City Foundries Co. Produces Better Gray Iron (Class 20, 30 & 40, A.S.T.M.) Castings Cheaper, Faster and Cleaner with this LINK-BELT Equipment



General view showing prepared sand elevator and transfer belt to Link-Belt ≻ Revivifier ≺

View showing distributing belt conveyor servicing 18 molders' hoppers.

The modern mechanized Forest City foundry consists of eighteen molding stations handling snap, pop-off and tight flask work. Here's how it operates.

1. Molds are prepared by molder and set on gravity roll conveyors.

2. Molds are poured and allowed to cool on the gravity roll conveyors.

3. Molds (sand and castings) are discharged onto a Link-Belt "No-Leak" apron conveyor by the use of a small removable section of gravity roll conveyor bridging the gap between the gravity roll cooling conveyors and the apron conveyor.

4. Sand and castings are conveyed to the Link-Belt shakeout screen where the sand and castings are separated.

5. Sand is conveyed from shakeout hopper by means of belt feeder having magnetic head pulley for removing tramp iron.

6. Sand is discharged to bucket elevator.

7. Bucket elevator discharges sand to Link-Belt vibrating screen which removes refuse material.

8. Sand goes to bin through measuring hoppers then to two mullers where sand is prepared and cooled.

9. Prepared sand is discharged to collecting hoppers, fed to bucket elevator which discharges to transfer belt.

10. Sand is discharged to Revivifier located at tail end of distributing belt. Sand is fluffed, aerated and given flowability.

11. Sand is then distributed to molders' hoppers ready for molding.

This installation provides continuous mass foundry production which means better quality castings at lower costs. It also eliminates the heavy manual handling of foundry work and reduces employee turnover, which is a decided factor in production costs.

Link-Belt foundry experience can help you.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities. 10,365

THE SYMBOL OF QUALITY LB LINK-BELT

LINK-BELT CONVEYORS

AND PREPARATION MACHINERY

MANUFACTURER'S ASSO FOUNDRY EQUIPME